JAN 7 1925

PUBLIC WORKS

CITY COUNTY STATE

1100 Texaco Asphalt Paved Cities and Towns

50 in North Carolina

146 in Texas

42 in Ohio

81 in Nebraska

60 in Oklahoma

36 in Florida

61 in Massachusetts

Schenley Park, Pittsburgh, Pa.

48 in Illinois

Capital Street, Lansing, Mich.

41 in New York

132 in Kansas

41 in Pennsylvania

65 in New Jersey

TEXACO

New York
Philadelphia
Richmond
Boston
Jacksonville
New Orleans
Chicago

The Texas Company, U. S. A.
ASPHALT SALES DEPT.
17 Battery Place, New York City

Cleveland
Oklahoma City
Kansas City
Houston
Dallas
Minneapolis
St. Louis

Austin Leaning Wheel Graders

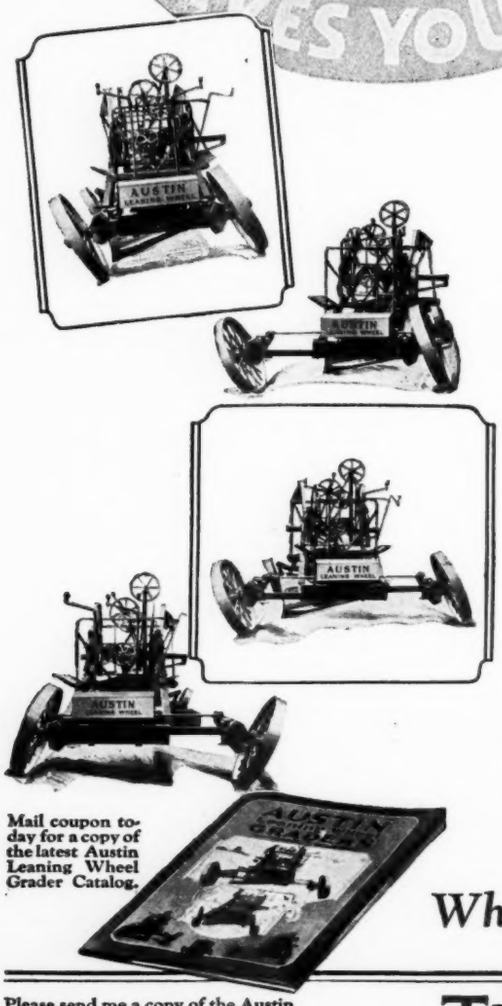
The time-tested features that have made Austin Graders the choice of experienced operators for over 40 years will all be found on the Leaning Wheel models. In addition, they are distinguished from all other Leaning Wheel graders by several improvements of great practical value. The Telescopic Rear Axle, Timken Tapered Roller Bearings and Alemite High Pressure Lubricating System are exclusive features whose value will be admitted by all impartial authorities.

The advantages of the telescopic axle are obvious. It is never in the way as a long, one-piece axle is very apt to be, and when fully telescoped has the further advantage of being much stronger than any long axle can hope to be.

Timken Tapered Roller Bearings are dust-tight and have many mechanical advantages over all other types. No other bearing is designed to stand the variable loads, or pressure, to which all grader wheels are subjected, and no other type can be taken up for wear instead of replaced.

The Alemite High Pressure Lubricating System is standard equipment on more than 250 automobiles, trucks and tractors. Its chief advantage is the fact that lubricant is forced into all bearings under a pressure of several hundred pounds to the inch, thus reaching every part of the wearing surface, and at the same time forcing out all foreign matter.

The Telescopic Rear Axle, Timken Bearings and Alemite Lubricating System are but three of the things that contribute to Austin superiority.



Mail coupon today for a copy of the latest Austin Leaning Wheel Grader Catalog.

Why take less in a leaning wheel machine?

Please send me a copy of the Austin Leaning Wheel Grader Catalog.

_____

_____

_____

THE AUSTIN-WESTERN ROAD MACHINERY CO.
CHICAGO

This machine will be on exhibition at the American Road Builders' Show

VOL. 55 NO. 12

Entered as second-class matter at the Post Office, at New York, N. Y., Sept. 1, 1922, under the Act of March 3, 1879.
Published monthly by **PUBLIC WORKS JOURNAL CORPORATION,** 243 West 39th Street, New York, N. Y.
Subscription price $3.00 a year, single copies 25 cents.
DECEMBER 1924

PUBLIC WORKS

CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 55 DECEMBER, 1924 No. 12

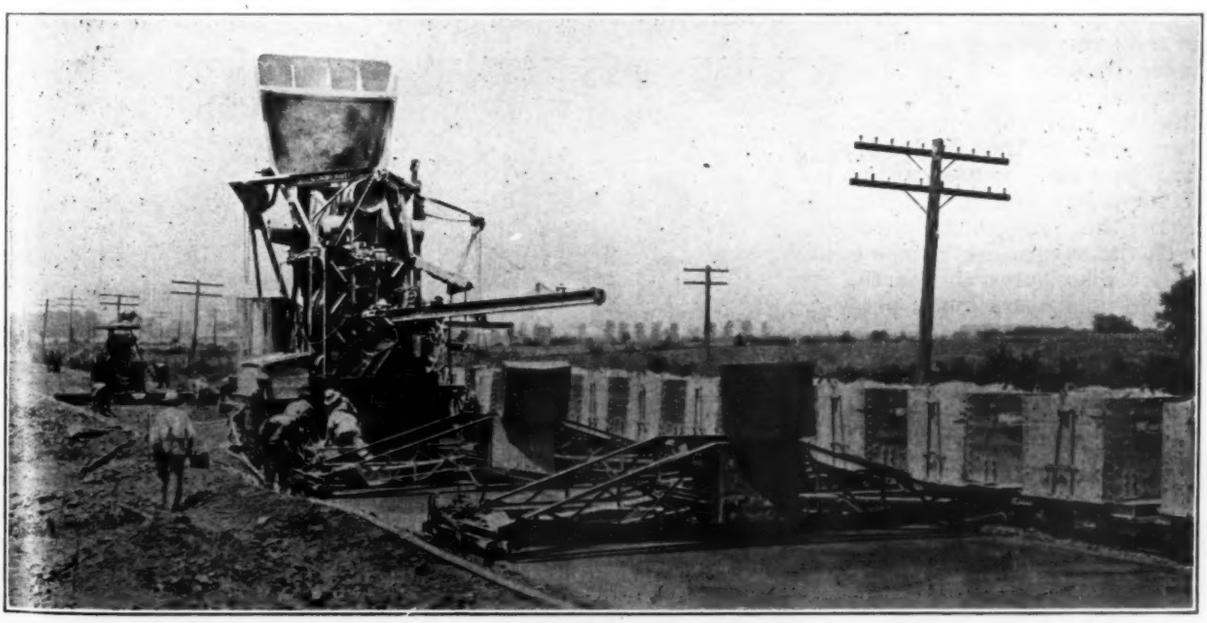
Concrete Paving Record in Illinois

More than half a mile of eighteen-foot pavement laid by one gang in one day, an average of nearly a third of a mile a day for a week, and over a quarter of a mile a day for the entire season. How it was done.

Not only has the state of Illinois broken its own 1923 record and the world's record for the amount of paving done in any one year by a given state by completing 1,100 miles of concrete paving during 1924, but also it is believed that one of the contractors engaged in laying a part of this pavement has broken the record for the amount laid by one gang and one mixer in any given day, and possibly for any six consecutive days. The work referred to is that done by the W. C. Meneely Company of Decatur, Ill., in laying standard 18-foot concrete pavement on the road between Decatur and Cairo. At our request, W. C. Meneely has described for us the methods and appliances used in establishing this record and given details of the work done during the record run.

In performing any construction work of this kind where an average daily run of a quarter of a mile of pavement is to be put through, the first thing of importance after selecting the equipment and getting it on the job is the matter of grading. A very large percentage of contractors fail to come wtihin their cost estimates because they do not give sufficient attention to the grading of the roadway.

"We have found that on large jobs there are invariably three distinct classes of grading which, if to be performed within the estimated cost, require three different types of grading outfits. These classes of grading are light cuts, on which we use wheeler outfits; somewhat larger cuts, on which the elevating grader pulled by the caterpillar tractor is used, and heavy cuts, on



PLANT USED IN MIXING AND FINISHING CONCRETE BY W. C. MENEELY CO.
In background, tractor pulling subgrader. Near mixer is surfacing machine used as strike-off. In extreme foreground is finisher tamping and belting. At the right is 15-car train of batch boxes. This equipment averaged 396 square yards an hour for an entire day's run, which totaled 2,671 lineal feet of road.

CRANE LOADING AGGREGATE INTO BINS.

which we use steam shovels. Whatever the nature of the cut and the type of outfit used, the latter must be capable of keeping the excavation well ahead of the concreting outfit, with due allowance for the weather and condition of soil, so that there may be no delay of the concrete gang and equipment."

Following as closely as possible after the grading outfit come the 12-foot blade grader, which is used to level the cuts and fills and put them within 1 inch of the grade. This grader is pulled by a 10-ton caterpillar tractor. Both the tractor operator and the grader operator are taught to check the grading by the grade stakes, and their skill in doing this is a very important part of the successful handling of the grade work.

After this blade grading, the high or low spots that could not be taken care of by it are brought to grade by two or three slip teams, which leave the grade ready for the form setting and subgrade gang.

The setting of the forms and surfacing of the subgrade are performed under one foreman, who has at his service a 7-foot blade grader drawn by a 4- or 5-ton caterpillar tractor, which also pulls the subgrading machine when making the final cut. The 7-foot blade is used to cut the form line and to roughly shape the subgrade, after which the subgrading machine cuts or distributes the earth, and the final operation is performed by a 3-ton or 4-ton gasoline roller. A crew of twelve men are used in subgrade work and setting the forms, approximately 6,000 feet of forms being used on this contract.

On this contract we used three Holt 10-ton tractors, with Western Wheeled Scraper Company's elevating graders and J. D. Adams Company's 12-foot leaning-wheel blade graders. We also had on the job any number of Western Wheeled Scraper Company's dump wagons, wheelers and slip scoops, and a "Best" tractor. The steam shovel was an "Erie." The forms used were the "Metaform." On these we used Lakewood and Hug subgraders.

CONCRETING

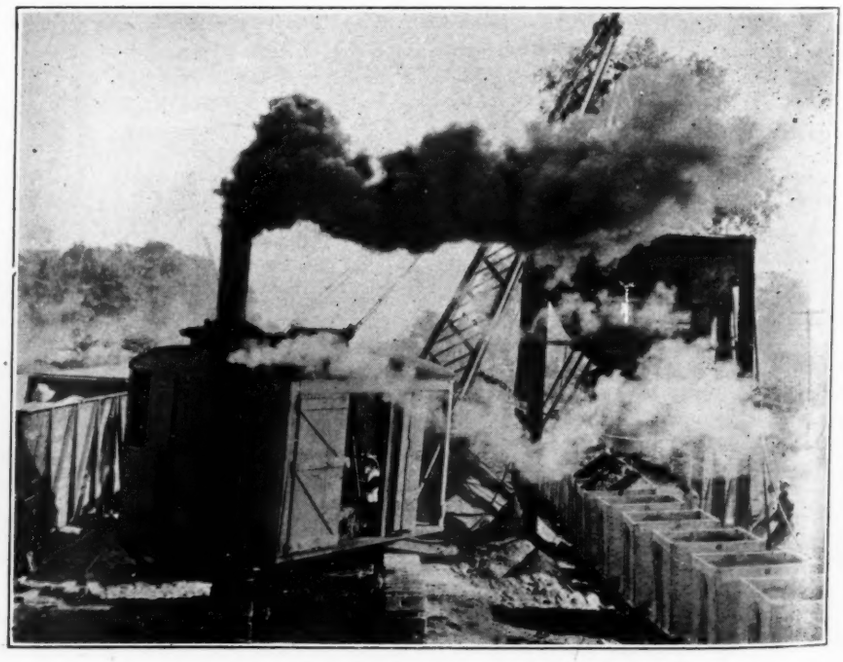
Plant. The plant is a very important part of concrete road construction, as it is here that all materials are unloaded, proportioned and loaded into batch boxes. Here also is the supply depot from which all other departments are supplied with gasoline, oil, small tools and repairs.

Where as much concrete is being laid daily as in this work, two cranes are necessary for unloading stone and sand. They load it either into storage bins or directly into two 50-ton proportioning bins. These proportioning bins were used to load two batches at one time. Trains bringing the cement were drawn up on a siding along one side of the storehouse, and the cement bags were either stored in the storehouse or taken directly from the cars through this to a 15-car train of batch boxes, which was drawn up along the platform on the other side of the building, this being long enough to accommodate a train of this length.

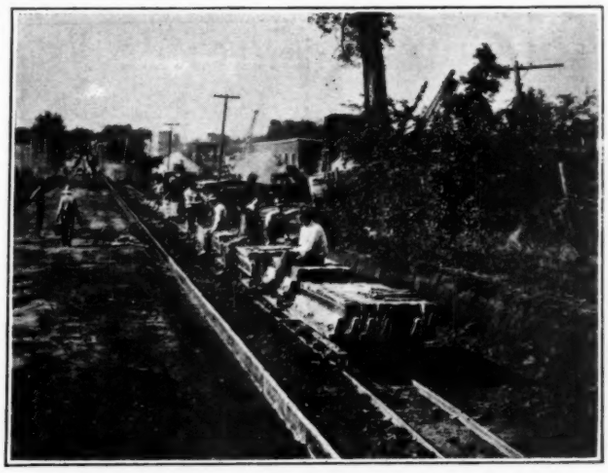
When run at its full capacity, the plant employed about twenty men.

The cranes used at the plant were a Type B steam "Erie" with a 36-foot boom, which handled the sand, and a No. 2 Koehring with a 45-foot boom, which handled the stone. The bins and batch-meters are Blaw-Knox make.

Transportation. The construction railroad was equipped with five 7-ton gasoline locomotives,



CRANE LOADING AGGREGATE INTO BINS.



CARRYING AHEAD A TRAIN-LOAD OF FORMS.

64 batch boxes and cars and six work cars. Four locomotives and sixty cars, connected up into four 15-car trains, were used to haul the aggregate to the mixer, except that when the mixer was close to the plant a less number of trains was required. One locomotive and six work cars were used to haul forms, rails and pipe ahead. The equipment included 5 miles of 24-inch gauge track and eight switches. The only night force used in the work was employed in connection with the railroad and consisted of a foreman, an engine man and five track men, whose duties consisted in taking out reinforcing steel, picking up and relaying the "run-around" or double track at the mixer, and running the forms ahead. Twenty-two men in all were employed in the Transportation Department, this including those required in mixing and placing the concrete.

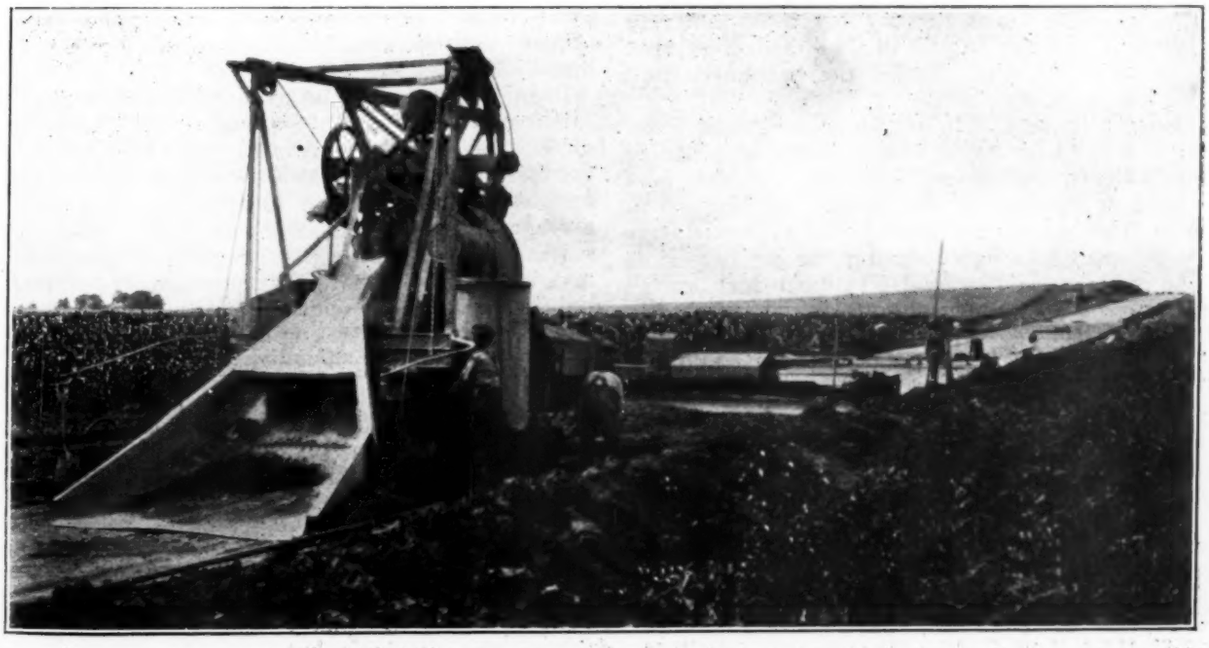
The track used for transportation was Lakewood track with pressed steel ties. On this, Western Wheeled Scraper Company's cars carried batch boxes of the same make, the trains being drawn by "Plymouth" locomotives.

Mixing and Placing. The concrete material in batch boxes was delivered to the concrete mixer in either 9-bag or 10-bag batches, a 32-E Koehring paver being used. A crane attached to the paver removed the batch boxes from the cars and emptied them into the mixer hopper. For handling the trains at the mixer, a double track or "run-around" was employed, which allowed the loaded train to pass close to the mixer until all of the batch boxes had been emptied, when the empty train proceeded ahead to a switch and ran backward around another loaded train which had meantime followed the empty train to a position alongside the mixer. The empty then backed to the loading station. In this manner it was possible to operate the trains without any loss of time whatever by the mixer.

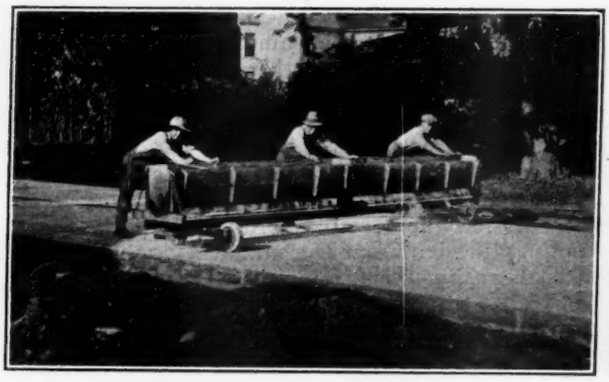
The water for mixing the concrete was delivered through 2½-inch pipe in the customary way, connections being inserted at intervals from which hose delivered the water to the mixer. When the mixer in moving ahead had reached the end of the hose in a given position, the intake end of the hose was at once pulled ahead by means of a team and coupled up to the next connection, the mixer meantime using the storage and measuring tanks, which have a capacity of three batches.

The water was furnished by two motor-driven triplex pumps pumping through a maximum length of 5 miles of 2½-inch pipe.

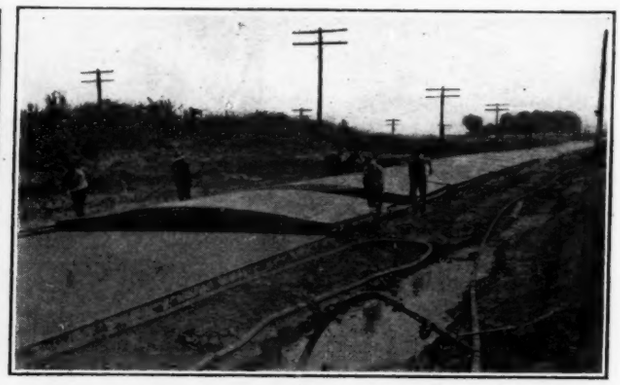
The mixer was followed by an "Ord" surfacing machine which acted as a strike-off and leveller and moved ahead only. The pavement was then straight-edged and the rear machine, a "Lakewood," tamped and belted it. The pavement was then straight-edged a second time and the finish-



A COMPLETED STRETCH OF THE MENEELY CONTRACT.



CALCIUM CHLORIDE DISTRIBUTOR.
Corrugated drum revolves as machine is pushed along, spreading the calcium. Made by the contractor.



SHADES USED ON PAVEMENT WHILE CURING.

ing machine backed up and tamped and finalbelted the pavement, which was then ready for curing.

As soon as the pavement had been finished it was covered by shades made by the contractor and traveling on wheels that ran on the forms, and after these had been run ahead, the pavement was kept wet by sprinkling. The final curing was aided by use of calcium chloride, which was spread by an 18-foot spreader designed and made by the contractor.

THE RECORD RUN

On several occasions runs had been made of from 1,500 to 1,700 feet in a day, and late in July the conditions seemed to be favorable for an attempt to break the record of 2,017 feet of pavement which had been made on August 14th, 1923. Accordingly, on the evening of July 29th arrangements were completed to begin operating at the plant at 5 A. M. on July 30th and at the mixer at 5:30 A. M. Actual mixing began at 5:40 A. M. and continued until 7:40, with 30 minutes out for lunch, giving an actual mixing time of 13½ hours. Every batch of concrete that was laid on July 30th was loaded on that day; no trains were loaded the evening before and left standing.

During these 13½ hours forty-one trains hauling 621 ten-bag batches were loaded and hauled one mile to the mixer. Here the concrete was mixed and placed at the rate of 46 batches an hour, this giving an average of approximately 1¼ minutes to a batch during the entire period. The amount laid was 2,671 lineal feet, or an average of 197.8 feet per hour.

During this day's run there were used 1,552 barrels of cement, 452 cubic yards of sand and 794 cubic yards of crushed stone; and over 13,000 pounds of calcium chloride were required for curing. This amount of material was approximately equivalent to 7½ cars of cement, 13 cars of sand and 21 cars of stone.

The day was cool, and although several showers threatened to cause a cessation of operations, it turned out to be an ideal day for men to work at top speed. It was, however, a very poor day for the setting of concrete, and this caused some little delay because the contractors were not able to pull the forms as soon as usual.

The Meneely Company feels that records that necessitate a shutting down of the work on the day following a record run, or a shortening of the previous day, cannot really be considered a record run, but that such a run should come in the course of regular work days. This record day was preceded on July 29th by a run of 1,699 feet and followed on July 31st by a run of 1,532 feet. The record for the week of July 25th to July 31st inclusive (the weeks, in the records of the Illinois State Highway Department, begin on Friday and end on Thursday), was as follows:

July 25th	1,413	feet in	8 hours
" 26th	1,579	" "	11 "
" 28th	1,511	" "	9 "
" 29th	1,699	" "	11 "
" 30th	2,671	" "	13½ "
" 31st	1,532	" "	11 "
Total	10,405	" "	63½ "

From July 16th to July 31st work was carried on for 130½ working hours, and during this time 20,022 feet of pavement was laid, or an average of 153.4 feet per hour. On July 29th and 30th and seven hours of July 31st one mile of pavement was laid in 31½ hours, or at the rate of 168 feet per hour.

From the start of the paving season on April 24th to the closing on September 20th, a total of 119,586 feet of pavement was laid by the Meneely Company in 850 working hours, an average of 1,405 feet per 10-hour day, or a daily average of more than ¼ mile. Mr. Meneely states that these large runs, continued for weeks and, in fact, throughout the season, were possible only with the full cooperation of the State Highway Department, its engineers and inspectors.

Expansion Joints in California

The California State Highway Department has been testing different expansion joints, the patent joint fillers which it had used being considered unsatisfactory as well as too expensive. The Department has adopted, tentatively at least, a filler made by combining sawdust and asphalt, the department engineers considering this efficient as well as inexpensive. Formerly expansion joints were placed at the end of each day's run or half-day's, but they are now placed at 100-foot intervals.

California Highway Notes

Probably in no State of the Union can be found more varied highway problems than in California. In the north most of the trans-Sierra roads will soon be closed by snow, although the Pacific highway will be kept open by the maintenance force.

A PLANKED DESERT ROAD

In the south, a few miles north of the Mexican border, the problem is to keep the roads free from drifting sand. No satisfactory way has yet been found of maintaining a permanent road here across a 6½-mile stretch of dunes which are continually shifted by the wind. The road here is built of planks bolted and spiked to stringers and held in place by three bands of strap iron. As the sand drifts over these it is removed with scrapers. The pine lumber, laid in 1916, is rapidly deteriorating, due to dry rot, and a new type of road is being tried on a stretch of 2,000 feet. This is being built of 6x8 redwood plank, the planks running cross-wise of the road and separated by 4x6 spacers, so as to leave 4-inch openings between them. They are held together by bolts, in sections 6 feet long, the sections being fastened together by hooks and eyes. After sand storms, instead of scraping off the sand a truck crane will lift sections of the roadway, the sand sifting through the openings between the timbers, and lower them upon the new and higher sand bed.

ON THE VENTURA COAST

One of the most spectacular contracts is that under construction along the Ventura Coast, known as the Hauser contract. Here the road is blasted out of cliffs of igneous rock that rise almost vertical from the ocean. Equipment had to be brought in by ocean scows and landed through a heavy surf. Drilling was done by means of ropes and ladders lowered from the top of the cliff, and tunnels driven to the inside of the roadbed, usually at grade, and cross-cuts made here, with large explosive chambers spaced about 30 feet apart. As many as 3,200 cans of black powder, each of 25 pounds, was often used in a single blast. In general, the roadbed section along the crucial stretches cuts through the igneous hard rock which forms the cliff faces, and intercepts the soft interior rock of sedimentary origin. This makes the blasting a delicate and uncertain matter, and it is not to be wondered that actual conditions are sometimes misjudged.

Only recently, the powder foreman, a man of years of experience, who has been on the job from the beginning, miscalculated how far back one of his large blasts would break. The top of the cliff, 150 feet above the explosive charge, broke about 60 feet back of the slope stakes, and carried away the ground on which the foreman and two helpers, who fired the shot, were standing. It is unbelievable that they could have gone down 200 feet to the very surf with all that mass of moving rock and live. Fortunately, all three escaped death.

HIGH CURBS ON CONCRETE ROAD

The Cuesta grade across the Santa Lucia range was originally, in stage coach days, 30 per cent or more. In 1915 the state built a new road on the east side with a 6½ per cent maximum grade.

On account of the heavy cuts and fills necessary, the new grade was allowed to settle and "find itself" for seven years before paving was attempted. Finally, in 1922, a contract was awarded for paving, including reshaping of the road surface, superelevation of curves, and "daylighting" of sharp points.

A reinforced concrete pavement, twenty feet wide and six inches thick, was laid with reinforced concrete curbs at the edges, ten inches high. Where the roadbed was wide enough to permit turning off the pavement, the curb was omitted, but an inverted curb of similar dimensions was placed beneath the pavement. This insured a maximum strength throughout the section.

The concrete curbs give the motorist a feeling of safety when passing close to precipitous slopes, and also make the edge, which on many pavements is the weakest spot, the strongest part of all. In addition, it takes care of surface drainage, preventing it from scouring the shoulder next to the pavement and soaking into the subgrade underneath.

PATCHING REINFORCED CONCRETE ROADS

Experiments in patching reinforced concrete by the maintenance department of Division VI, using a portable pneumatic hammer for breaking the concrete, are described as follows by S. J. Corfield, assistant division engineer, in "California Highways," the official publication of the State Highway Commission:

"The pavement on which the breaker was tried was five inches thick, reinforced with lateral ⅜" bars, and exceptionally tough to break out by hand methods. At the inception of the work, several days were spent breaking concrete by hand. Results were slow, the six laborers employed being unable to keep a one-sack mixer busy half the working day.

"A 6 x 6 Ingersoll-Rand compressor and a Type CC25 Ingersoll-Rand pavement breaker were then placed upon the job. The output was doubled and only one man was required to actually break the concrete. Three and four other laborers were necessary to remove the broken concrete from the grade, but the mixer was kept busy eight hours a day. By noon each day or shortly afterward, enough concrete had been broken out to keep the mixer working the entire day.

"Labor costs for the patching were reduced from 20 cents to 14 cents per square foot by the use of the pneumatic breaker.

"Extensive patch work also has been done near Lost Hills, in Kern County, with the aid of a pneumatic breaker. The division's experiments

indicate that the pneumatic breaker is adaptable to pavement repair work where any considerable amount of concrete is to be broken and removed.

"The breaker's real value, however, lies not so much in the low cost of breaking the concrete, but in keeping the work ahead of the mixer, permitting it to operate for a full day instead of only part of the day, as is necessary when the slower hand methods are used.

"Compressors used on these jobs should be mounted upon rubber tired trailers so that they may be moved rapidly from place to place. Such an outfit also may be used for rock drilling on emergency jobs."

HIGHWAYS THROUGH CITIES

It is almost certain that the proposed Bayshore highway will be located, not through the main street of Palo Alto, but as far east of it as possible. Says the *Palo Alto Times*:

The earlier plan of having the Bayshore highway connect with Middlefield road was highly objectionable. It would mean multiplied dangers to school children and others in a section where existing dangers from traffic are already too numerous. It would mean serious depreciation of property values for residences in the section affected. It would mean dividing the city by a thoroughfare with traffic as incessant as that now seen on the peninsula highway.

Keeping the Bayshore road out of the city proper will not only mean the prevention of these disagreeable conditions in Palo Alto, but will be a benefit to motorists who use the road, as their speed would not have to be cut down to urban limits when outside the urban zone.

Federal Highway Aid in Canada

In the various provinces of Canada the cost of building highways which have been approved by the Canadian Highways Commission, a part of the Department of Railways and Canals of Canada, is shared by the Department, which contributes 40% of the total cost.

Static Tests on Concrete Roads

Conclusions from tests of slabs made this year by the Bureau of Public Roads. Effect on static resistance of character of subgrade, reinforcement, and bituminous top. Appliances and methods adopted and devised for these tests.

Four years ago the Bureau of Public Roads began testing concrete road slabs under impact forces, which was followed by further tests during the summer of 1923, and the results of these were published in the July issue of "PUBLIC WORKS." After these impact tests had been concluded it was thought that a check on the impact results and additional information could be obtained by subjecting the same slabs to tests under loads applied statically. These static tests were conducted during the summer of 1924 and have been described in an article by J. T. Thompson, highway research specialist of the Bureau of Public Roads, in the November issue of the official organ of that Bureau.

The conclusions from these static tests are summarized as follows:

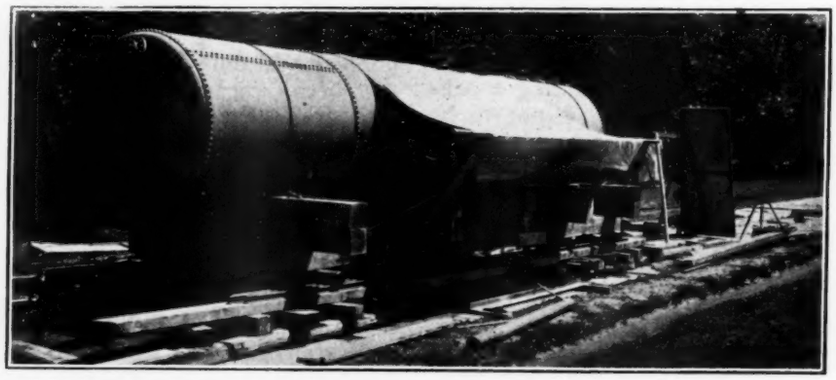
1. The static resistance of both the corners and the edges of the rigid slabs is affected by the nature of the subgrade, the more resistant the subgrade to load the greater the resistance of the slab, and vice versa.

2. The resistance of the rigid slabs to static loads does not vary with the square of the depth, but as some power greater than one and less than two. About 1.75 is the average value, the exponent being higher for slabs on the wet subgrade and lower for those on the dry subgrade.

3. The corners and edges of concrete slabs of the size and thickness tested offer about the same degree of resistance to static loads.

4. The presence of mesh reinforcement as employed in the slabs under consideration (it was placed uniformly 2 inches from the top of the slab) does not increase the load-carrying capacity of concrete slabs but does give rise to a tendency to hold together and resist complete failure after initial or elastic failure has taken place.

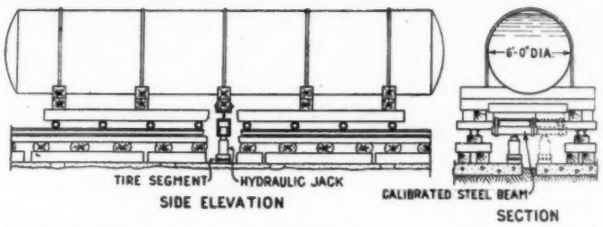
5. The bituminous topping laid on the rigid slabs does not increase the resistance of the slabs to static load.



THE TANK USED IN THE STATIC LOAD TESTS, SHOWING SADDLES AND CRIBBING.

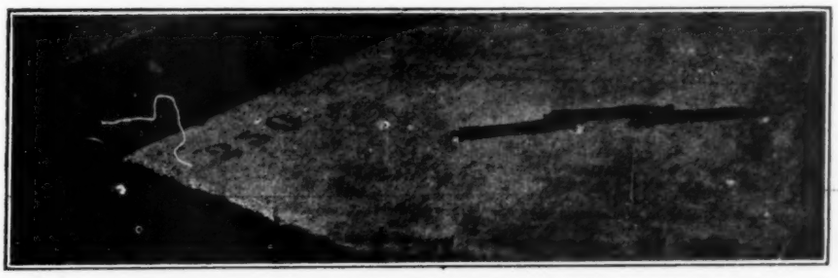
6. At the ordinary summer temperature encountered, bituminous slabs of the types tested show no slab strength

About 45% of the slabs had been placed on a carefully drained subgrade and



ARRANGEMENT OF APPARATUS FOR STATIC LOAD TESTS.

the balance on a subgrade permanently saturated with water kept standing level with the bottom of the slabs. Some were plain concrete, some concrete mesh reinforced, some concrete bases with bituminous tops, bituminous bases with bituminous tops and finally macadam bases with bituminous tops.



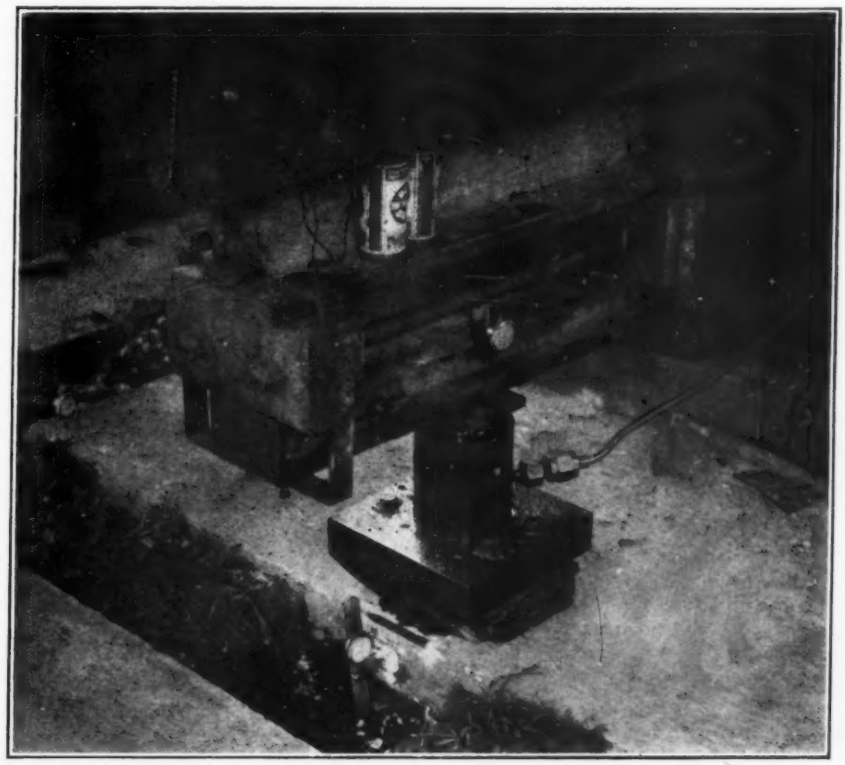
THREE GRAPHIC STRAIN GAUGES SET ALONG DIAGONAL OF SLAB, OVERLAPPING SO AS TO CATCH MAXIMUM FIBER STRESS.

In making the static tests, the loads were applied by a hydraulic jack acting through a segment of a solid rubber truck tire bolted to a cast-iron block. The necessary reaction for the jack was furnished by a large tank filled with water which the jack partially lifted as it pressed down on the slab. The load was measured by a simply supported 4-inch by 6-inch chrome-nickel steel beam on a 30-inch span, the upward reaction of the jack loading this beam at the mid point, the deflection of the beam measuring the load. The deflection of the concrete slabs was measured by an Ames dial reading to ten-thousandths of an inch. Deflections of the bituminous slabs were measured by engineers' scales set vertical on the tire block, the readings being made against horizontal arms secured to steel pins driven firmly into the subgrade.

Fibre deformations produced were measured by means of graphic strain gauges, of the type developed by the Bureau of Public Roads. In testing the edges, such gauges were used in both the top and the bottom of the slab. In testing the corners they were set along the diagonal on the top of the slab, one gauge overlapping its neighbor so as to insure at least one gauge catching the crack at failure and recording the maximum fibre stress. In the edge tests the load was applied at the middle of the slab 5 inches from the edge, and in the corner test on the diagonal 7 inches from the corner.

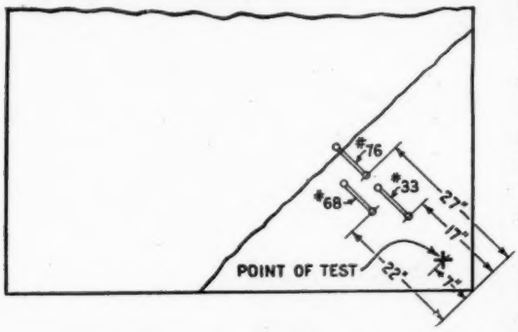
The bearing value of the subgrade was tested by applying a constantly increasing load to a small circular bearing block in contact with the scraped surface of the subgrade, measuring the penetration of this block into the subgrade under various loads.

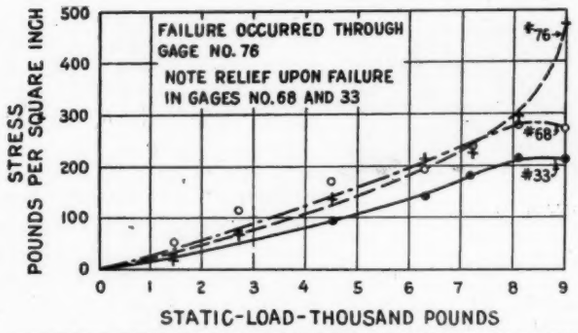
Records of the fibre deformation for various static loads were inscribed by the graphic strain gauge on a smoked glass plate, which plates were then fixed with varnish and placed in a projecting lantern, and the greatly magnified records were measured. The measurements of the total fibre deformation were reduced to strains and the unit stresses corresponding to these strains were computed from the modulus of elasticity as determined from tests on 6x12-inch cylinders which had been cast when the slabs were constructed.



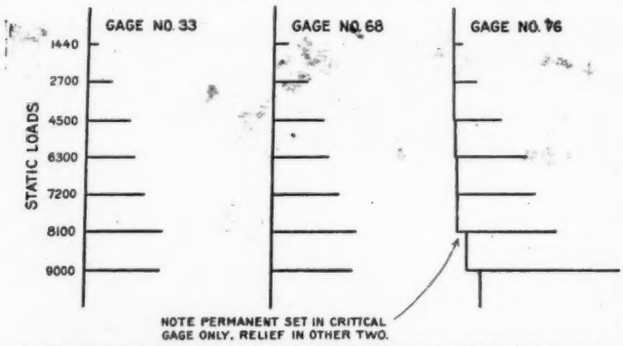
VIEW OF APPARATUS SHOWING CALIBRATED STEEL BEAM WITH TEN-THOUSANDTHS INCH AMES DIAL MEASURING ITS DEFLECTION, HYDRAULIC JACK, TIRE BLOCK, SLAB DEFLECTION GAUGES AT POINT OF TEST AND AT CORNER, AND GRAPHIC STRAIN GAUGES IN TOP AND BOTTOM OF THE SLAB AT THE EDGE.

The load which caused a tensile failure in the concrete was called the "static load resistance." In the edge tests, the load which caused the neutral axis to shift upward was taken as the static load resistance, while in the corner tests the strain gauge records together with the load-





CORNER TEST OF 6" CONCRETE SLAB NO. 244, INDICATING STATIC RESISTANCE OF 8,100 POUNDS.



MAGNIFIED GRAPHIC STRAIN GAUGE RECORDS OF CORNER TEST OF SLAB NO. 244, INDICATING A STATIC RESISTANCE OF 81,00 POUNDS.

stress plots furnished the evidence for determining this point.

Among the conclusions reached by a study of records was one that, while slabs laid on a wet and yielding subgrade offer less resistance to statically applied loads than those on a dry, firm subgrade, this resistance does not seem to have any definite relation to the subgrade bearing value as determined by the penetration test. (This would seem to indicate that a different method of making the subgrade test is desirable.)

The load resistance was found to vary as some power of the slab depth greater than 1 and less than 2, the influence of subgrade resistance upon the exponent being quite marked, the exponent approximating 1.92 on wet yielding subgrade and 1.5 on dry subgrade.

A number of the slabs have 2-inch surface courses of Topeka asphalt. These tests did not show that such a top course added anything to the strength of the slab, and in some cases the reverse appeared to be true. The 1:3:6 slabs with bituminous tops on wet subgrades were badly disintegrated, while similar ones without bituminous tops on the same subgrades were in fair condition. "The 1:1½:3 concrete in the covered slabs on both the wet and dry subgrade compares favorably with that in the uncovered slabs." It was suggested that the prevention of surface evaporation by the bituminous covering, producing a saturated condition of the concrete, might be responsible for the weakness.

Static tests were made on twelve bituminous slabs, but "it was apparently impossible to determine when the slabs failed, as in no instance did the load-deflection curves show a sharp break, notwithstanding the fact that loads were applied and curves plotted far beyond the point where wide cracks had opened up around the tire segment. In some instances the test was carried to a point where the section of slab directly under the tire segment was completely detached from the main slab and yet the load deflection curves did not indicate a sharp break. The test was nothing more than a soil penetration determination. The effect of these slabs seems to be merely to distribute the loads to some extent over the subgrade. . . . . The writer concludes from his observations that these bituminous sections, at least at the temperatures encountered, have an insignificant, if any, slab strength."

More Test Pavements

The past two or three years have seen numerous test pavements constructed and tried out, some by states, some by the Federal Government and one at least by a business organization, and these have resulted in many developments and changes in highway construction methods. Two tests are now being conducted by states, one by Pennsylvania and the other by Ohio, both with the cooperation of engineers of the Bureau of Public Roads.

In each of these tests the subject of the support of the foundation—that is, the subgrade and the sub-base material—are given special attention. The expressed objects of the Pennsylvania test road are to determine the action of a concrete pavement with an 8-5-8 section under a 26,000-pound gross load; the influence of subgrade material on the strength of the pavement; data to aid in designing the best cross-section; and the effectiveness of a longitudinal joint. The Ohio road, which has not yet been constructed, will be planned especially to study the relative advantages of imported sub-base materials and also the effect of grade. Test roads so far built have all been very nearly level, we believe, but the Ohio road will have grades varying from .6% to 6% in the 2,500 feet of its length.

In the Pennsylvania road, which is 2,000 feet long and nearly level, six types of subgrade will

be tested—old macadam scarified and re-rolled; sandy loam; shell; clay; 4 inches of a sand-clay mixture over clay, and 4 inches of a cinder-clay mixture over clay. At approximately the middle point of each of the several sections of pavement a transverse expansion joint was placed; and adjacent to this and on one side of the longitudinal joint for a length of 20 feet, inserts were placed in the slab in such manner that gauge readings may be obtained for determining the strain at both the top and the bottom of the slab. When constructing the pavement, test pieces in the forms of beams and cylinders were cast and from these an effort will be made to determine the modulus of elasticity and rupture and the compressive strength of the concrete used in the various sections. Stress readings will be obtained when a 26,000-pound truck is run along the center and also near the edge of the pavement, the tests being made both during dry summer weather and during the spring thaw

It is hoped that these tests will throw some light on the questions of whether this section is adequate to carry loads of 26,000 pounds, or whether it should be modified in any way; what influence the subgrade has on the strength of the pavement and to what extent the 4-inch layer of porous material on a clay soil improves conditions; and how much of the load on one side of a tongue-and-groove longitudinal joint is transmitted to the slab on the other side.

On the Ohio road the sub-base materials used will be Grade A gravel, Grade A sand, cement clay, and granulated slag; and these will be used for depths of 2 inches, 4 inches and 6 inches. In addition, in the Ohio tests, there will also be used various hard-surface paving materials, while in the Pennsylvania tests concrete only will be used.

Sources of Funds for Highway Purposes

The total income for road purposes of States, counties, townships and districts. About 38 per cent obtained from bonds, the same from general property taxes, 15 per cent from motor vehicle owners, and 9 per cent from Federal aid.

By Henry R. Trumbower*

The United States is now engaged in spending approximately a billion dollars a year on its rural highways. This includes all the expenditures for that purpose made by the Federal Government, the various States, and the counties and local subdivisions. The expenditures rose from $80,000,000 in 1904 to $240,000,000 in 1914; and in 1921, the last year for which complete and detailed figures are available, the total expenditures for highway purposes were $1,036,587,772. So far as can be ascertained from the reports of the various State highway commissions, the rural highway expenditures for the present year and for the last two years are not far different from the 1921 expenditures.

The principal items for which these expenditures were made are set forth in the following tabulation, which is a summary of the total expenditures for all rural highway purposes and is the consolidated data for all States, counties, townships and districts:

Construction; roads and bridges	$626,965,373
Maintenance; roads and bridges	248,593,169
Principal and interest payments on highway bonds	89,280,946
Purchase and repair of machinery and equipment and general and miscellaneous items	35,716,931
Total	$1,036,587,772

*Economist, United States Bureau of Public Roads.

The actual work done on the highways for the year represented an outlay of money of slightly over 900 million dollars after making due allowance for the payments by the various State and local governments on account of interest on bonds and payments on principal. As nearly as can be determined, between 60 and 70 per cent of the highway expenditures were for construction and the remainder was spent on maintenance.

These highway expenditures were applied to 2,941,294 miles of rural highway, which was the total mileage of all types in the United States on January 1, 1922. Disregarding the amount spent for interest and principal payments on bonds, the total highway expenditures for 1921, when applied to the country's mileage of roads, represents an average expenditure of $322 per mile of rural highway. As a matter of fact, while this is an average figure there were many miles of highway constructed where the costs were far above this average expenditure per mile and, on the other hand, there was a great part of this rural highway mileage which had little or no money spent on it. At the end of 1921 only 387,760 miles, or 13.2 per cent of the total rural highway mileage, were classed as surfaced roads which were improved with sand clay, gravel surfacing, or surfacing of a higher

type than that. The amount of work accomplished on our highway system for 1921 is represented in part by construction work done on 110,976 miles. The details are set forth in the following statement:

TOTAL MILEAGE OF RURAL ROADS BUILT DURING 1921

Surfaced Types:		
Sand clay	7,010 miles	
Gravel	22,009	
Water bound macadam	3,070	
Surface treated macadam	994	
Bituminous macadam	1,349	
Sheet asphalt	208	
Bituminous concrete	1,025	
Cement concrete	4,817	
Brick	322	
Miscellaneous	367	
		41,171 miles
Earth Roads:		
Constructed to definite grade with permanent drainage structures	7,919 miles	
Partially graded and drained	61,886	
		69,805 miles
Grand total mileage on which construction was done during 1921		110,976 miles

Although the total construction expenditures were reported to have been $626,965,373, there is no doubt that a substantial portion of the machinery and equipment item should be considered a construction expenditure. If we assume that 70 per cent of this item represented construction expenditures, which is the ratio of the reported construction expenditures to the total construction and maintenance expenditures, and add this amount to the amount expended for construction of roads and bridges, we arrive at a figure of $651,967,224, which represents the total costs of the construction work performed on 110,976 miles of rural highways. According to these data the construction expenditures for this mileage amounted to an average of $5,875 per mile. There are definite facts available as to the amount of mileage to which the maintenance expenditures were applied.

This leads us to the main inquiry as to how the funds were raised to meet these annual expenditures for highway purposes. The complete data which are available relate to this same year, 1921. The investigations made covering the sources of all funds—State, county and local—revealed that for that year they amounted to $1,149,437,896, which sum of money was obtained in the following manner. *This is the total income for all rural road purposes and is the consolidated data for all States, counties, townships and districts.*

Bonds		$438,109,273
Federal and Forest Road Aid		79,333,226
Motor Vehicle Revenues:		
License Fees	$118,942,706	
Gasoline Taxes	3,683,460	122,626,166
General Property Taxes		415,680,010
All Other Sources		93,689,221
Total		$1,149,437,896

AMOUNT RAISED BY BONDS

The funds derived from the sales of bonds amounted to 38.1 per cent of the total highway income for 1921. The detailed analysis shows that every State except North Dakota raised a part of its money spent on roads from bond issues. The States which obtained the largest proportion in this manner were Arkansas, which secured 70.2 per cent of its highway income through the sale of bonds; West Virginia, which secured 69.1 per cent, and Louisiana, which secured 68.1 per cent. The States which were the least dependent on bond issues were New Hampshire, which secured only 2.8 per cent of its highway funds in this manner; Connecticut, which secured 3 per cent, and Vermont, which secured 4.7 per cent. It also appears that in certain sections of the country groups of States relied largely on funds derived from bonds to meet their highway expenditures; in other sections bonds were issued to only a limited extent for highway purposes. The West South Central group of States, consisting of Arkansas, Louisiana, Oklahoma, and Texas, derived 59.3 per cent of its total highway income for that year from the sale of bonds. The New England group of States, on the other hand, secured their highway funds from other sources with the exception of 12.7 per cent, which represented the proceeds from bond sales.

It has been found that those States which have had unusually large construction programs are obliged to seek a very considerable portion of their funds through the sale of bonds. In making a comparison of the two groups of States mentioned above, it is found that in the West South Central States the construction costs amounted to 61.8 per cent of the total highway expenditures, and in the New England States the item of construction was only 53.1 per cent of the total. There are also other reasons which require certain States to rely more on bond revenues; the ability to obtain funds readily from taxes and from other sources is of prime consideration.

While bonds have been issued in all of the States, except North Dakota, to meet the expenditures incurred for highway improvements, there were twenty-seven States at the end of 1921 where the State governments had not issued any bonds for highway purposes; where bonds were issued in those States for highway work, they were the obligations of counties, townships, or road districts[1]. At the end of 1921 the total outstanding bonds issued for highway purposes were $1,222,312,300; of this amount States had issued $345,574,100, and counties and other local subdivisions had issued $876,738,200. The share of the States was 28 per cent of the total and the local share was 72 per cent. These highway bonds are of rather recent origin; the survey of rural highway finances showed that from the year 1914 to 1921 inclusive there were authorized a total of $1,525,536,900 of highway bonds by State and local authorities. This was considerably more than the outstanding issues at the end of 1921. During the year 1921 the total sale of highway bonds amounted to $303,572,800, which

[1]Alabama, Arizona, Arkansas, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Montana Nebraska, New Jersey, North Dakota, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, Wisconsin

was slightly less than 25 per cent of the total amount outstanding at the end of that year.

The economic principles which should control the policy of issuing bonds for highway purposes do not differ from those which are invoked in the consideration of the wisdom of creating an indebtedness for other business purposes. When a community issues highway bonds it is a mobilization of its economic resources and a pledging of its credit for the purpose of improving its highways. It is axiomatic that funds raised in this manner should not be used for current maintenance expenditures, but should be devoted to the more permanent features of highway improvements. Under the bond plan the construction of a good system of roads capable of serving a community is possible within the minimum space of time.

The economic advantages of improved highways are reflected in the lower up-keep costs of motor vehicles and in reduced fuel expenses; such savings should be off-set against the annual costs of the improvement in interest, refunding, and maintenance charges. There are also certain social benefits which cannot be readily measured: the increased school attendance, additional business stimulus, and greater satisfactions to be obtained from rural life are difficult to evaluate in terms of money.

Not every bond issue for highways, however, has been a success from the financial point of view. Such failures can usually be traced to mismanagement of some kind or other. In some instances the funds derived from bond issues were spent in the construction of temporary road surfaces without any improvement of the grades and without making proper provision for drainage; improvements of this kind had disappeared long before the time when the bonds fell due.

FEDERAL AID GRANTS

In 1921 the amount of money granted by the Federal Government in the shape of Federal and Forest Road Aid amounted to $79,333,226, which was 6.9 per cent of the country's total highway income. The apportionments made under the Federal Aid Act are expended upon two classes of highways, one of which is known as primary or interstate highways and shall not exceed three-sevenths of the total mileage which may receive Federal aid; the other class of highways are those which connect with the interstate roads and are known as secondary or intercounty highways, which constitute the remainder of the mileage which may receive Federal aid.

The appropriations available for highway work within the States are apportioned among the several States in the following manner: one-third in the ratio which the area of each State bears to the total area of all the States; one-third in the ratio which the population of each State bears to the total population of all the States, and one-third in the ratio which the mileage of post-roads in each State bears to the post-road mileage of all the States.

The amount of the Federal aid extended for any one highway project is limited to 50 per cent of the total cost and in no case may it exceed $15,000 per mile. This limitation can be illustrated in this manner: where the total cost of constructing a highway is $20,000 a mile, the Federal aid apportionment is $10,000; where the total cost is $40,000 a mile, the Federal aid apportionment is $15,000. The law further provides that the Federal funds can be applied only to such projects as are under the direct control of a State highway department, that all highways constructed with the aid of Federal funds shall be free from tolls of all kinds, and that the Federal Government shall have the right to maintain properly Federal-aid roads if the State authorities fail to do so after a road has been built, and that such maintenance costs be debited against that State's allotment of Federal funds.

Those States which contain public lands are treated somewhat more liberally with respect to the Federal aid per mile of road constructed; in case any State contains unappropriated public lands exceeding 5 per cent of the total area of all lands in the State, the Federal aid payments on such projects shall not exceed 50 per cent of the total estimated cost thereof plus a percentage of such estimated cost equal to one-half of the percentage which the area of unappropriated public lands in such States bears to the total area of such State. This provision in the law makes it easier for those States to finance their share of highway construction costs in which the Federal Government owns large tracts of public lands.

WHAT MOTOR VEHICLE OWNERS PAY

For the period ended June 30, 1924, the Federal Government expended as aid for highway construction $353,082,098. This expenditure for highways on the part of the Federal Government may be contrasted with the internal revenue collected as taxes on the sales of motor vehicles and automobile accessories and on passenger cars used for hire which, up to June 30, 1924, amounted to a total of $749,040,569. The users of motor vehicles, therefore, contributed in this manner more than twice the amount that the Federal Government paid out in aid toward highway construction. The Federal aid payments and the motor vehicle excise taxes are shown by years in the following tabulation:

Year Ended June 30	Amount of Federal Aid for Highways	Excise Taxes Collected from Motor Vehicles, etc.
1917	$ 49,279	.....
1918	837,176	$ 23,981,268
1919	3,995,102	49,341,990
1920	25,168,794	145,963,034
1921	63,533,861	117,322,741
1922	93,924,885	106,219,381
1923	77,173,116	146,183,607
1924	88,399,885	160,028,548
Total	$353,082,098	$749,040,569

The amount of money devoted to highway purposes in 1921 which was obtained from motor vehicle revenues (license fees and permits, and gasoline taxes) was $122,626,166, or 10.6 per cent of the total highway income. In that year the

receipts from payments for licenses and permits were $122,478,654 and the gasoline tax receipts were $5,302,259, a total of $127,780,913 collected from the motor vehicle. The amount used for highway purposes was 89 per cent of the total motor vehicle receipts. This difference is accounted for by the fact that in many States the administrative expenses of motor vehicle registration and licensing departments were deducted from the gross receipts before the funds were turned over for highway use; certain States also diverted a part of the motor vehicle revenues for use other than on the highways. The contribution on the part of motor vehicles was $12.20 per vehicle. In that year there were only fourteen States which had in effect a gasoline tax. If those fourteen States which were collecting a gasoline tax are considered separately, we find that the motor vehicle license fees and the gasoline taxes averaged $14.44 in those States.

In each successive year the amount of the motor vehicle revenues produced by the license fees and gasoline taxes has shown great increases and the ratio of these revenues to the total highway expenditures has also increased greatly. In 1922 the receipts from license fees were $152,047,823 and gasoline tax collections were $11,923,442, resulting in total motor vehicle revenues of $163,971,265, or an average payment of $13.40 per vehicle. In 1923 the gross receipts from registration fees, licenses and permits was $188,970,992, and the gasoline tax collections amounted to $36,813,939; the total motor vehicle revenues were $225,784,931, which represented an average payment of $14.95 per motor vehicle. The figures which are available for the first six months of 1924 show that $199,472,682 was collected in license fees and the gasoline tax yielded $32,430,410; thus the total motor vehicle revenues for this half-year period were $231,903,092, or an average payment of $14.90 per vehicle. Using these figures as a basis, it is estimated that the motor vehicles license fees for the year will amount to approximately $225,000,000 and the gasoline tax receipts will be close to $75,000,000, which will mean total motor vehicle revenues in the neighborhood of $300,000,000 for the whole of 1924.

The great increase in motor vehicle revenues in this three-year period is principally due to the increase in the number of motor vehicles. From 1921 to 1924 the registration increased from 10,463,295 to 15,552,077, or an increase of 49 per cent; during that same period the total motor vehicle revenues increased from $127,780,913 to $231,903,092, or an increase of 81 per cent. The larger increase in revenues as compared with the increase in the number of motor vehicles registered can be traced to two evident causes: the advance in the average license fee per vehicle and the introduction of a gasoline tax by a large number of the States. In 1921 the average license fee was $11,70; in 1924, for those cars registered on July 1, the average license fee was $12.80.

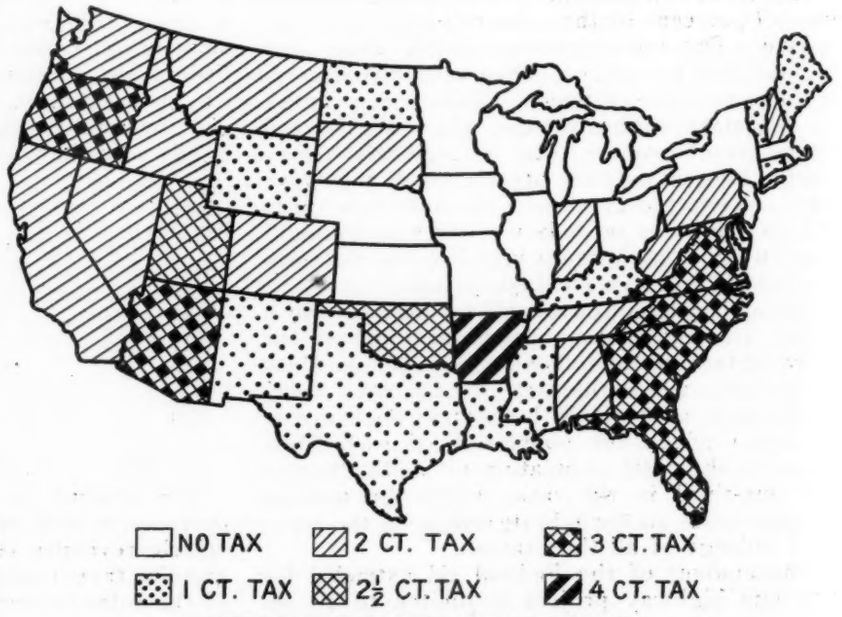
GASOLINE TAXES

At the present time thirty-five States, not including the District of Columbia, are charging a gasoline tax and a number of the States which do not have the gasoline tax are seriously considering the passage of such a law enabling them to raise highway revenues in this manner. The rates range from 1 cent to 4 cents per gallon.

GASOLINE TAXES IN SEVERAL STATES

1-cent Tax	*2-cent Tax*	*2½-cent Tax*	*4-cent Tax*
Connecticut	Alabama	Oklahoma	Arkansas
Louisiana	California	Utah	
Maine	Colorado	*3-cent Tax*	
New Mexico	Delaware	Arizona	
North Dakota	Idaho	Florida	
Texas	Indiana	Georgia	
Vermont	Maryland	Kentucky	
Wyoming	Montana	Mississippi	
	Nevada	North Carolina	
	New Hampshire	Oregon	
	Pennsylvania	South Carolina	
	South Dakota	Virginia	
	Tennessee		
	Washington		
	West Virginia		

Of the thirty-five States collecting this kind of a tax, eight States have in effect a 1-cent tax; fifteen collect a 2-cent tax; two collect a 2½-cent tax; nine have a 3-cent tax, and one State charges 4 cents. During the period that the gasoline tax has become popular with States as a means of securing additional revenues from the motor vehicle, there has been the tendency for States to start in with the lower rate and



GASOLINE TAX IN THE UNITED STATES.

later on increase it. Of the fifteen States which are charging a 2-cent tax, seven started by charging a 1-cent tax first; the other eight began with a 2-cent tax. Oklahoma, which now has a 2½-cent tax, began with a 1-cent tax. Six of the States with a 3-cent tax began by collecting a tax of 1 cent, and two States began with a 2-cent rate and later raised it to 3 cents. Arkansas, which has now a 4-cent tax, began with a 1-cent tax.

One of the advantages claimed for the gasoline tax is the small collection cost in cases where the tax is collected from the wholesale distributors of gasoline. Indiana reported that the State collected a total gasoline tax of $4,554,544 at a collection cost of 0.12 per cent; this included all salaries properly chargeable to this account, office furniture and supplies, postage, printing of forms, stationery, and traveling expenses.

In 1923 the amount of money applicable to highway work by or under the supervision of State highway departments derived from motor vehicle license fees was 81 per cent of the total fees collected; only 58 per cent of the gasoline tax receipts were turned over to State highway departments. The balance of the funds collected from motor vehicle owners and users was turned over to counties for highway expenditures or was credited to general funds.

GENERAL PROPERTY TAXES

The 1921 survey showed that general property taxes contributed $415,680,010 to the year's total highway income, or 36.2 per cent. In addition, $93,689,221 was derived from other sources, a large part of which amount consisted of appropriations from funds in the respective State treasuries which, in turn, had their sources in tax levies. For our present purposes we may consider both of these items as having been payments made by the general public, and may, therefore, be regarded as taxes, although a small portion was derived from special sources which could not be clearly segregated. The sum of these two items, $509,369,231, or 44.4 per cent of the total highway income, is regarded in this analysis as the direct contribution of the public towards the cost of highway construction and maintenance and towards the principal and interest payments of the bonds outstanding. The per capita tax burden for highway purposes in that year was $4.83. The highest ratio is found in the New England States, where 56 per cent of the total highway income was derived from general property taxes; in the West South Central States the general property taxes accounted for but 27.4 per cent of the total highway income. It is observed that those groups of States which showed the highest percentages of the total highway income derived from taxes showed the lowest ratios of funds derived from bonds to highway income.

The marked increase in the funds derived from motor vehicle taxation without a similar increase in highway expenditures will tend to reduce the amount of money which has been raised in the past from the taxpayers and also through bond issues. Just what the proportions are at the present time cannot be determined until another complete survey for the country as a whole has been made which shows the consolidated highway expenditure and income data for States, counties, and other political subdivisions. While no definite and authentic figures have ever been produced to show how much the general property taxes on motor vehicles amount to in those States where the license fees are not considered as payments in lieu of personal property taxes, it is realized that funds derived in this manner must form a considerable part of the highway income raised through property taxes.

Although the sum of money spent on highway construction and maintenance in a year's period appears to be large when the total is considered, it amounts to an average expenditure per capita of about $9.00, which is only about 1.13 per cent of the per capita income of the people of the United States. The great earning power and economic value of improved roads cannot be measured in monetary terms, but it is generally admitted that they amount to more than the costs. The modern highway improved along proper lines is deemed an investment which will return in service large dividends to the users and to the public at large, from both an economic and social point of view.

Kentucky Bond Issue Defeated

Although the $100,000,000 highway bond issue was ordered by the voters of Illinois, the neighboring state of Kentucky defeated by a considerable majority the $75,000,000 bond issue proposed for highways in that state. Commenting upon this result, "The Scraper," the official organ of the Kentucky Association of Highway Contractors, called attention to the fact that the Association had taken no part whatever in the fight for or against the bond issue, although many of the state's highway contractors as individuals opposed the issue. The reason for this opposition, which may be read with interest by contractors in other states, is given by "The Scraper" as follows:

It has been the history of other states where road bonds were voted that the attraction of a large sum available for roads has been the magnet to draw contractors from all over the country. The Kentucky Good Roads Association said in print: "It will bring Kentucky many more road contractors than are now in business here. It will insure greater competition for bids."

There are already, in this state, many more contractors than there is work for and this volume of competition has already produced bids so low that there is not a reasonable profit. This competition comes from at least a dozen states now and it was realized that additional competition would be ruinous.

A statement frequently made by proponents was that if the bonds were voted, we would have here another North Carolina. This statement causes shudders to run down the spine of the contractor, for if there is any one state which can be pointed to as the place to be avoided by highway contractors, it is North Carolina. When that state voted road bonds there was an influx of contractors which resembled the '49 gold rush to California. What subsequently happened is generally known. At the last report there were over 60 contracts being completed by surety companies.

Few contractors have been willing to repeat their first experience and most of the North Carolina contractors have been content to leave competition to strangers.

Perhaps the most compelling reason was the possibility that after the bond proceeds were spent in five or six years there would be no funds for further improvement. Bond advocates urged that this would not be true as the increased revenue from automobiles would provide a surplus beyond sinking fund requirements. This, however, was merely an estimate and the fact remained that present revenue would be just about sufficient to care for the retirement of the bonds and necessary maintenance. The contractor naturally felt that a steady business amounting to $9,000,000 a year continuously was preferable to a boom of $15,000,000 a year for five years and after that—nothing.

It may be said that all the reasons advanced are purely selfish. This is absolutely true and is the compelling reason for the aloofness of the association in the bond fight. What industry does not take an active interest in any question involving its stability? Most of them take an active part from personal selfish motives, if from no other, and in the case of the Kentucky bonds the construction industry, the second largest in the country, would have done nothing out of the ordinary if it had openly worked for its own preservation.

Roads and Wages

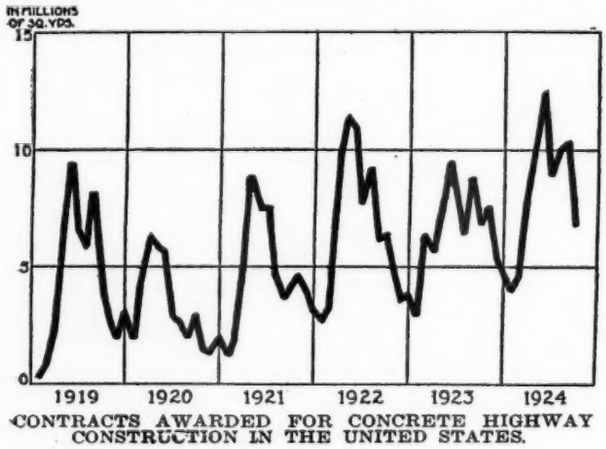
The following is from the November 1 issue of the "Monthly Review" of the Federal Reserve Bank of New York:

ROAD BUILDING

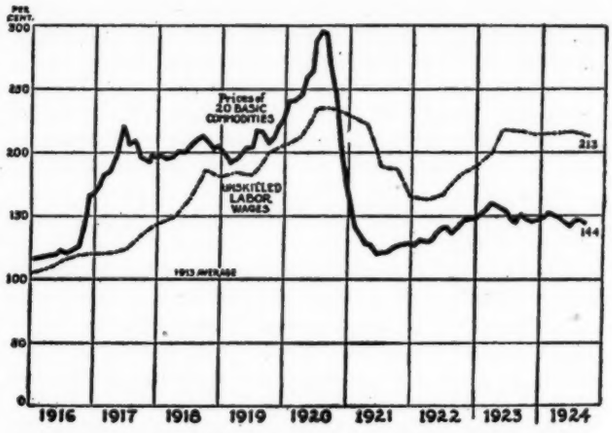
Exceptional activity in residential construction during the past year has been supplemented by unusually heavy road building. The number of square yards of concrete pavements for roads, streets and alleys contracted for in the first nine months of this year has been greater than in any corresponding period. The steady growth in this type of road construction is indicated by the accompanying diagram, which shows the contracts let by months since 1919. The increased activity in this field has been an important factor in the continued high level of cement production, about 25 per cent. of which, it is estimated, is used in construction of pavements. Road construction has absorbed a considerable number of unskilled laborers released by the curtailment in manufacturing industries.

WAGES IN THE SECOND FEDERAL RESERVE DISTRICT

The general level of wages remains little changed. Reports to this bank from representative employers in this district show that hiring rates for unskilled labor are, for the most part, very nearly the same as on July 1, and on October 1 a year ago. Rates for skilled labor in this district likewise have been little changed in recent months, though in the building trades fewer bonuses are being paid. Average weekly earnings of factory workers have increased since July, due to the reduction in part time employment. The following diagram shows the recent movements in this bank's indexes of unskilled labor wages and prices of basic commodities, both of which form important elements in the cost of manufacture.



CONTRACTS AWARDED FOR CONCRETE HIGHWAY CONSTRUCTION IN THE UNITED STATES.



WAGES OF UNSKILLED LABOR COMPARED WITH PRICES OF BASIC COMMODITIES. 1913 AVERAGE TAKEN AS 100 PER CENT.

Highway Engineering Course at University of Michigan

In our issue of December, 1923, we described briefly the greatly increased facilities provided by the University of Michigan for giving instruction in highway engineering and highway transport. The University has developed these courses, which it is bringing to the attention of practicing highway engineers and men engaged in highway transport who desire to obtain advanced instruction but who are not able to attend through the entire college year on account of their professional work. These courses are given, therefore, during the months of December to March inclusive. To further facilitate the attendance of such engineers or those who are interested in particular subjects only, each subject is covered in a concentrated period of two weeks, during which the entire time of the men is given to one subject. The fee for each course is ten dollars. Anyone over twenty-one years of age can take these courses, except that certain preliminary instruction is necessary before taking the courses in the highway structures and two of the courses in highway engineering.

The courses are believed to be especially valuable to highway engineers, chemists, contractors, engineering salesmen, highway transport engineers and managers, motor truck salesmen and others interested in highway engineering and highway transport. They are conducted in a manner similar to the meeting of a session of a highway convention, the professor in charge lecturing and the members of the class taking part in the discussion. As widely separate geo-

graphical sections and diverse former experiences are represented in the class, these discussions add greatly to the value of the course. In addition to Prof. A. H. Blanchard, who occupies the chair of Highway Engineering and Highway Transport, these subjects are taught by two other professors and three additional experts; while six professors give instruction in the departments of Civil Engineering and Geology and the division of Automotive Engineering. Also, lectures are given by twenty-four men high in the various branches of engineering and business connected with highway work.

The schedule of the two-week courses are as follows:

December 8th to 19th—"Highway engineering financing, management and organization"; and "American and English highway transport methods."

December 22nd to January 2nd—"Highway transport economics and surveys"; and "Gravel and quarry plants, and gravel and broken stone roads."

January 5th to 16th—"Brick, cement-concrete, stone block and wood block pavements"; "Highway engineering theory and design"; and "Interrelationship of highway, railway and waterway transport."

January 19th to 30th—"Bituminous surface treatments; bituminous macadam, bituminous concrete and sheet asphalt pavements"; and "Highway transport management."

February 2nd to 13th—"Highway laboratory research"; "Highway structures"; and "Mechanism, operation and maintenance of motor trucks, tractors and trailers."

February 16th to 19th—Eleventh annual state conference on highway engineering at the University of Michigan.

February 23rd to March 6th—"Highway specifications, contracts and jurisprudence"; and "Highway transport costs and record systems."

March 9th to 20th—"Highway engineering theory and design"; "Grading machinery and operations, drainage systems, and earth and clay roads"; "Highway transport legislation"; and "Traffic engineering and its application to street design and city planning."

Also there is a course in highway engineering and one in highway transport occupying the seminar from December 8th to March 20th.

Wisconsin Highway Engineer

Since the resignation of A. R. Hirst as chief engineer of the State Highway Department of Wisconsin, John H. Donaghey has been acting chief engineer. He has now been appointed State Highway Engineer. Mr. Donaghey has been connected with the State Highway Commission since 1911, prior to which he had been highway commissioner of Sauk County.

Unusual Waterworks Leak

It is reported that, owing to a recent local drought, a Tennessee city found it necessary to investigate and stop leaks in its water distribution system and in doing so discovered a leak in the supply main between the source of supply and the city limits which was so abundant and had continued over so long a period that a farmer had built a concrete spring house over it, with the idea that he had a spring on his property.

Water Meters for Small Towns*

Does 100 per cent. metering of small town water supplies pay?

By F. V. Fieldst

The question in hand could be easily answered if it did not specify small town; with the mass of statistics that are available as to the consumption of water in metered and unmetered cities, there can be little doubt in the mind of water works men as to the value of 100% metering for cities. If the city exists whose records show that the cost of its water supply has been increased by metering, these records have been well concealed.

There is, between the small town water supply system and that of the city, a certain analogy, which can give the small town a lesson that many cities have learned at great expense and it will be worth while to consider a few of the outstanding features of such lessons. For example, take the city of Chicago, an extremely bad example of a partially metered water supply. The consumption of water in Chicago in 1923 was 294 billion gallons; 83 billion gallons were metered—that is about 30%, and this 30% brought in $5,500,000, approximately, while the remaining 70% brought in $3,500,000 approximately. And where the consumption per day should be 150 gallons per capita, it is 275, with a peak load of 400.

There are many cities that have cut their consumption in half by 100% metering. There are many small towns of today that will grow into cities, and by adopting 100% metering as small towns they will save millions of dollars. It is easier to put in 100% metering in the small town than in the city; the political government of Chicago has failed for 20 years to take action on the recommendation of the chief engineer to provide for 100% metering.

But considering the small town as such, will 100% metering pay as an investment? Assuming that it will not and that only wasteful customers and large users will be metered, who shall decide which is the wasteful customer? If meters are installed at the request of the customer, it will be the careful, saving man who will insist on having a meter; so that, unless authority is given to the water departments to place a meter on any customer, there is no need for metering whatever. The customer who asks for a meter expects to reduce his own bill.

*Paper before the North Carolina Section, American Water Works Association.

†Superintendent of water and light plant, Mooresville, N. C.

As an investment a meter must save enough water to pay for depreciation and interest on the investment. The investment will be about $15 per dwelling service. Considering the life of the meter as 15 to 20 years, the depreciation will be about 6%; and for a return of 6%, a total of 12% or $1.80 must be realized each year per meter. The average water rate for North Carolina is 30c per 1,000 gal., which calls for a saving of 6,000 gal. per meter, only 500 gal. per month. One or two leaky fixtures, a few minutes a day with the hose, letting the water run to prevent freezing—any one of these and many other wasteful practices will far exceed the 500 gal. per month needed to insure a return on the meter. Furthermore, the economical water user is not required to pay a proportion of the additional expense entailed by the wasteful habits of his neighbors.

Sewage Treatment at Worcester

Plant, now thirty-four years old, being supplemented by one employing grit chambers, Imhoff tanks, sprinkling filters and secondary sedimentation tanks

From the early days of sewage treatment in this country, Worcester, Mass., has been of interest to sewerage engineers. In 1890, City Engineer C. A. Allen constructed at Worcester the second chemical precipitation plant in the country; which plant is still in use treating about 86% of the city's sewage. In 1904, Harrison P. Eddy, then superintendent of sewers, built the first detritus chamber constructed in this country. From 1899 to 1910 sand filters were constructed, and these are now treating about 14% of the sewage flow after it has passed through two settling basins.

In 1919 the State Legislature enacted a law requiring the city to have a new sewage treatment plant ready for operation by April 1, 1924, which time was later extended one year. In conformity with this order the city is now building an Imhoff tank and trickling (or sprinkling) filter plant. In addition to Imhoff tanks and trickling filters, there will be detritus chambers, dosing tanks, secondary tanks and sludge drying beds.

The detritus or grit chambers consist of two channels 85 feet long and 8 feet wide, the depth at the inlet end being 2.5 feet, and at the outlet end 4 feet, with a grit capacity of about 100 cubic yards, the chamber being designed for an average velocity of about 1 foot per second. When the chamber is to be cleaned, the water will be drawn off through gates and sewage then admitted to scour out the grit through a 30-inch gate on to a nearby sand filter. After drying out on this filter, the grit can be removed to dumps. Or cleaning may be done by a crane and clamshell bucket if this should seem desirable later. From the detritus chambers the sewage will flow through 1,100 feet of inverted siphon and a Venturi meter to the Imhoff tanks.

IMHOFF TANKS

There are twelve Imhoff tanks, each 60 x 90 feet with a maximum water depth of 31 feet. Each has four sedimentation compartments with bottom slopes of 1.5:1, the capacity of which gives 2½ hours detention when treating 28,000,000 gallons a day. Each tank has five gas vents extending the length of the tank, the middle three being 36 inches wide and the two outside ones 18 inches; this giving a gas vent area about 21% that of the tank. Each tank contains six sludge hoppers 30 feet square with bottom slopes of 1 on 2, providing 17½ feet of sludge storage below a point 24 inches below the slot, which is calculated to be sufficient for about five months' storage or 3 cubic feet per capita. Drains are provided for drawing off the supernatant sewage to the top of the sludge hoppers. Eight-inch sludge pipes operated by hydrostatic head, will remove the sludge to adjacent sludge beds. Perforated water pipes on the slopes are provided for starting the sludge.

There are four dosing tanks, each with two compartments 30 feet square and twin alternating 36-inch siphons. Each tank doses one-quarter of the filter area, or 3½ acres, under a head varying from 7 feet to 1 foot. Each compartment has an approximate capacity of 36,500 gallons, which provides alternate filter dosing and resting periods of 3 minutes each when operating at 28,000,000 gallons per day.

SPRINKLING FILTER

The sprinkling filter is 752.5 feet by 792 feet, or 14 acres in area, and contains 10 feet in depth of crushed granite and trap rock screened through a 3-inch ring and held on a 1¼-inch ring. Each quarter section of the filter has a concrete main distributor varying in diameter from 54 to 24 inches, continued by a cast-iron pipe decreasing from 20 inches to 12 inches. The distributor laterals are of cast-iron, 8-inch reducing to 6 inches. These distribution pipes are to be held in the top stone and provided with nozzles so arranged as to be staggered and 15 feet apart.

The filter floor is of concrete and slopes to main drains which collect from 100 feet of floor on each side and carry the effluent to the secondary sedimentation tanks. The filter is enclosed by a concrete wall, and either half can be flooded if desired.

There are four secondary sedimentation tanks, one for each quarter of the filter. Each tank is 60 x 120 feet with 15 feet water depth and has in the bottom eight hoppers 30 feet square and 7 feet deep. The sludge is pumped through 8-inch sludge pipes either to the Imhoff tanks or to sludge-drying beds. Eighteen acres of the present sand filters above referred to lie at such elevation that they can be used for sludge drying beds in connection with the Imhoff tanks without the necessity of pumping.

PUBLIC WORKS

Published Monthly
at 243 W. 39th St., New York, N. Y.

S. W. HUME, President J. T. MORRIS, Treasurer

Subscription Rates
United States and Possessions, Mexico and Cuba $3.00 year
All other countries ..... $4.00 year

Change of Address
Subscribers are requested to notify us promptly of change of address, giving both old and new addresses.

Telephone (New York): Pennsylvania 4290
Western Office: Monadnock Block, Chicago

A. PRESCOTT FOLWELL, Editor

CONTENTS

CONCRETE PAVING RECORD IN ILLINOIS. Illustrated 359
Expansion Joints in California 362
CALIFORNIA HIGHWAY NOTES 363
STATIC TESTS ON CONCRETE ROADS. Illustrated 364
More Test Pavements 366
SOURCES OF FUNDS FOR HIGHWAY PURPOSES. Illustrated. By Henry R. Trumbower .. 367
Kentucky Bond Issue Defeated 371
Roads and Wages. Illustrated 372
Highway Engineering Course at University of Michigan 372
Wisconsin Highway Engineer 373
Unusual Waterworks Leak 373
WATER METERS FOR SMALL TOWNS. By F. V. Fields 373
SEWAGE TREATMENT AT WORCESTER 374
EDITORIAL NOTES 375
Highway Finances—The Progressive Speed Record in Laying Concrete Pavements—Publicity for Investigations—Two Policies—Underestimating by Engineers—Highway Grading Bids.
MOTORIZATION OF CHICAGO'S STREET BUREAU 378
An Unusual Curb 380
Non-Uniform Waterworks Valves 380
GARBAGE COLLECTION STATISTICS. Table .. 380
Swamps on Watersheds 384
Welding Cast-Iron Pipes 384
Yarning Leadite Joints 384
SEPARATE SLUDGE DIGESTION AT ONEIDA, N. Y. Illustrated. By Henry W. Taylor 385
WATER SUPPLY INCREASE WITH NO CAPITAL INVESTMENT 387
National Employment Agency 388
Pan American Standardization 388
To Blast Colorado Snow Drift 388
BUREAU OF PUBLIC ROADS REPORT 389
WAYNE COUNTY'S HIGHWAY PLANS 392
RECENT LEGAL DECISIONS 393

Highway Finances

More than three million dollars a day for several years past has been spent for constructing and maintaining rural roads in the United States. How this enormous sum has been and is being raised is told in this issue in an article written at our request by the economist of the U. S. Bureau of Public Roads.

"Federal Aid" amounts to only about 7 per cent of the total expenditures. The balance is raised by states, counties, townships or road districts. So far as we have learned, only two states assess any part of the cost on the abutting or directly benefiting property, and in Arkansas, at least, the plan has not exactly proved popular. About 40 per cent is raised by direct taxes on the general public, another 40 per cent by sale of road bonds, and most of the balance by motor vehicle license fees and gasoline taxes.

This does not tell the entire story so far as the motor vehicle owners are concerned, however. It is believed that they have paid 30 per cent of the expenditures of 1924. Some of this has gone into the general state fund, but a much larger part is used directly for road work and for meeting interest and sinking fund payments on road bonds.

At least two states, Illinois and North Carolina, voted large bond issues with the understanding that all payments connected therewith would be met by automobile fees and gasoline taxes. The State Highway Commission of North Carolina informs us that "the income from automobile license fees and gasoline tax is sufficient to carry the interest on the bonds, sinking fund and maintenance of the roads, in addition to the operation expenses of the commission." We understand that Illinois has been equally as successful, the voting last month of an additional one hundred million of road bonds seeming to confirm this.

Undoubtedly other states, which did not secure votes for their bond issues on similar understandings that automobilists would relieve the taxpayers of all the burdens incident thereto, have found that such is largely the case. The chairman of the State Highway Commission of West Virginia said, in October last: "To the surprise of everybody, the construction of our state road system by a bond issue has not, so far, required a single cent of taxes from the general property owner. The money required to pay interest on the bonds, provide the annual sinking fund for the principal, pay the costs of road maintenance, and meet all the overhead expenses of the State Road Commission, is all being provided by the receipts from automobile licenses and the gasoline tax."

At the present time this method of raising the half of the highway funds that are not obtained from the general taxes, local and Federal, seems to be the most popular; even the automobilists themselves have objected in only one state, so far as we know. From the information now available no state should have any difficulty in arranging to raise all the funds for highway work that it can spend to advantage.

The Progressive Speed Record in Laying Concrete Pavements

Laying 18-foot concrete pavement with one gang at an average rate of almost 200 feet per hour for a day, and 164 feet per hour for a week, as described in the first article in this issue, is the record to date, we believe. Mr. Meneely probably holds the record only temporarily, however, although he himself may be the one to beat it next year.

In 1917 we described what we believe was the record high-speed job up to that time—750 feet of 16-foot pavement a day, with thirty-two men at the mixer, made by Frank L. Cohen in Westchester County, New York. In 1921 W. J. Porter, working on Long Island with eighteen men at the mixer, reached a maximum of 950 feet of 20-foot road in a 9-hour day, or 105½ feet per hour, as described in the issue of PUB-

LIC WORKS for October 15, 1921. This is equivalent to 117 feet per hour of 18-foot road as compared to Mr. Meneely's 198 feet.

It would seem to be difficult to surpass the clock-like precision of movement of Mr. Meneely's transportation and concreting gangs and equipment, which for an entire day averaged a batch every minute and a quarter, with the aggregate hauled a mile from bins to mixer. But someone will somehow beat this record next year, and we expect to tell about it.

Much of the progress made during the past five years or so has been due to the evolution of mechanical appliances—mixers, trucks, finishers, bins, cranes, forms and many others—and the intelligence of contractors in selecting those most suitable for each particular job. Future progress will undoubtedly depend largely upon developments along the same line and the most successful contractors will be those who keep themselves informed concerning the latest appliances available for their work.

Publicity for Investigations—Two Policies

During the past few days two reports have reached this office, each giving the results of investigations conducted by a department of the Federal Government. But there the similarity stops.

One gives the results of investigations conducted between June, 1923 and June, 1924. It gives them briefly, because most of them have already been made public.

The other describes and gives the results of investigations made between July, 1913 and December, 1916, and describes them in detail because *they* have *not* previously been made public.

The U. S. Bureau of Public Roads made its report for 1923-1924 under date of October 15th and six weeks later distributed printed copies of the same. The U. S. Public Health Service presented its report for the period 1913-1916 in March, 1924 and printed copies of it were ready for distribution about seven months later.

Nor does the above comparison tell the whole story. The Bureau of Public Roads publishes a monthly in which appear descriptions of investigations under way, results to date, and tentative conclusions based thereon; and its engineers and investigators are always ready to give any information available in the form of articles for appropriate periodicals and papers before highway organizations.

This difference in the practice of the two bureaus is, we understand, due to their opposite policies; the one, that no information concerning an investigation should be given out—especially no tentative conclusions—until a final report can be prepared and approved by the head of the Service, for fear that later data or more mature deliberation may to some extent require modification of them; the other, that the public is entitled to such advantage as may be had from immediate knowledge of individual results and tentative conclusions.

The advantage of the latter policy is frequently great. It stimulates coincident investigation by others along similar lines and thus secures a much broader and more varied assortment of data upon which the bureau's investigators may base their conclusions; while, its own data as well as those others being known, its conclusions can be checked by experts outside the bureau, thus increasing both the reliability of the conclusions and the confidence of everyone in them.

Whether or not this co-operation with outside agents was a predetermined feature of the policy of the Bureau of Public Roads, it has become a most important one, not only in encouraging investigations by others, but also in generating public interest in and understanding of its own investigations and conclusions, and thus securing that confidence in its work which, as public officials and departments are ever anew discovering, results from frank and full publicity.

A disadvantage of the other policy is that reports may be and frequently are so long delayed as to have little except historic value when finally published. To a considerable extent this is true of the report referred to, that dealing with the "Pollution and Purification of the Ohio River." Since 1913 great progress has been made by sanitarians in acquiring knowledge relative to surface oxidation and other purifying processes of streams; moreover many of the data given in the report no longer apply to present conditions, the bacterial content of the river at Cincinnati, for instance, having increased nearly fourfold during the past ten years. That a part of the long delay in publication was due to the complete absorption of the officials of the Service in the excellent work done by them during the War is really of little moment. The collection of the data had been completed before we entered the War and they could have been published in their entirety then, when they were of practical value; in which case there would be no need for the present rather perfunctory report accompanying them.

To our mind, the only defensible policy with respect to scientific investigations, especially those made with public funds, is prompt publicity of all results, rather than waiting until a final and complete report can be made. No one can hope to deliver the final word on any scientific subject, for if there is one thing that this generation has learned, it is that science is infinite; each investigation can at best furnish but a step in the progress of a science or art, and that step must be timely to be of value. Moreover, probably the credit for no recent advance in science can be claimed by a single investigation. It is the interchange of ideas and discoveries between scientists the world over that has caused the phenomenal progress of the past fifty years, and the more prompt and free this interchange between all, the more certain and rapid the advance made by each.

Underestimating by Engineers

Considerable discussion has been caused recently by action of the American Association of Engineers, which has asked engineering societies, deans of engineering schools and practicing engineers to state their views as to the responsibility of engineers in the preparation of cost estimates. The special cause for raising the question at this time was the submission to the Board of Directors of that society for decision of a case in which a city engineer had made official estimate of work for which considerable appropriations had been made, but as his estimate was greatly exceeded "without justification by increased wages or material prices, large additional appropriations became necessary on account of the original estimate proving grossly inadequate."

The questions being submitted by the Society for the opinions of others are the following: "What are the engineer's moral obligations in the preparation of cost estimates? What conditions, professional or political, are responsible for the prevalence of inadequate estimates and how can a warning against such influences be formulated in a statement of principle? Are there any conditions in engineering practice which make it necessary also to formulate a warning against temptations to make cost estimates excessive? Are there any circumstances under which an estimate that proves grossly incorrect does not represent a violation of high standards of professional conduct?"

The officials of the society state that it is well known that in many cases public improvements would not be approved by the voters if they were aware of the actual cost, although the officials are convinced of the fact that such improvements are desirable and necessary; under which conditions it might be a question whether the engineer would be justified in under-estimating so as to secure a favorable vote. One of the questions is, is he justified in doing this on his own initiative, and is he justified in doing so at the request of the executive public officials to whom he reports?

The tendency to under-estimate is by no means confined to engineers. It is common knowledge that anyone who builds himself a residence must expect to find it costing him more than the architect's estimate, and the same is true of almost any large undertaking involving the development of structures or processes under varying or variable conditions.

We believe that a reference to past history will show that engineers' estimates are much more reliable at present than they were fifty years ago. At that time under-estimating was quite general, if not almost universal; while at the present time we believe that an examination of engineers' estimates will show that in the majority of cases they are reasonably close to the actual cost of doing the work upon which the estimate was based. For example, an examination of thousands of lettings of highway work during the past ten years has given us the impression (although we have made no record from which a definite determination can be made) that the engineers' estimates as often overrun as they underrun the accepted bids for the work in question. A recent illustration is offered by the highway work in Delaware. According to a recent statement, a comparison of the estimates of the state highway engineers with the cost of the highways built during the past two years show that the total of the estimates agrees within less than 1% with the total of the costs. During 1923 the department constructed thirty different stretches of highways at a cost of $2,848,000, for which work the engineers' estimates had been $2,827,000, an under-estimate of only .7%.

In a great many cases, the engineer is in no way to blame for the increase in cost. For instance, a sudden increase in cost of materials or wages which could not have been foreseen may take place; in others, the public officials or individuals for whom the work is being done may decide upon extensions or improvements which had not been contemplated originally. In many instances the engineer finds it necessary to make a more or less intelligent guess as to the conditions that will be encountered in the prosecution of the work, such as the presence of quicksand in deep excacations; while in other cases floods, storms and other occurrences generally referred to as "acts of God" may serve to greatly increase the cost of performing the work. We suppose, however, that the question submitted by this society refers only to those cases where an engineer with reasonably good judgment could or should have foreseen that the work contemplated would cost considerably more than his estimate and that the only reasonable assumption is either that the estimate was deliberately made smaller than it should have been or that the engineer was grossly lacking in ability.

We can hardly believe that there are two opinions as to the ethics of deliberate underestimating, and it is a question to our mind whether any good resulting from a public discussion of the matter will not be more than balanced by the impression which is likely to reach the public that either deliberate or unskillful under-estimating is much more common than it is, and thus lead to a lessening of the confidence which the profession deserves at the hands of the public.

Highway Grading Bids

While estimating the cost of proposed work is a very important feature of engineering, it is hardly to be expected that engineers will estimate as closely as contractors, for to the latter the most important consideration is the money received, while to the former it is the character of the work. How, then, can engineers be expected to estimate closely what actual cost will be when contractors' bids vary so widely?

The handling of earthwork is among the most

fundamental of contracting operations and was probably the earliest of such operations to be engaged in, and yet it still seems to remain the most uncertain. The statement was made a few months ago by an official of the highway department of one of our largest states that his observation was that the great majority of losses incurred by contractors and business failures of contracting firms were due to unwise bids or inefficient operations in connection with grading rather than any of the other features of highway work.

In the first article in this issue Mr. Meneely says: "A very large percentage of contractors fail to come within their cost estimates because they do not give sufficient attention to the grading of the roadway."

This idea would seem to be borne out by bids received by the Pennsylvania Department of Highways on November 3rd. These bids were for grading and drainage, for reinforced concrete pavement and for a reinforced concrete bridge. The maximum and minimum bids for the bridge were $10,578 and $12,390, respectively; the highest and lowest of twenty-one bids for reinforced-concrete on Route 97 were $498,131 and $592,050, respectively, the highest being 19% higher than the lowest; of nine bids for reinforced-concrete on Route 241 the lowest was $287,000 and the highest $378,848, 32% higher than the lowest; and of twenty-one bids for reinforced-concrete on Route 221 the lowest was $219,915 and the highest $283,744, 29% higher than the lowest. One contract was for a little more than 10 miles of grading and drainage, for which eighteen bids were received, and the lowest of these was $382,484 and the highest was $908,480, while the average of all was $544,034. Here we have the highest bid about 2-1/3 times the lowest, with the other bids ranging at more or less uniform intervals throughout this entire range.

Nor is such non-uniform bidding confined to the East. On November 12 the highway committee of the state of Washington opened bids on two projects, one largely excavation and grading, the other largely concrete pavement. In the former the bids for common excavation varied from 30 cents to 75 cents; for loose rock from 43 cents to 96 cents, and for solid rock from 50 cents to $2.50. But the bids for concrete pavement varied only from $2.70 to $3.13, and the next highest bid was $2.98, only 10 per cent above the lowest, as compared to 300 per cent for excavation if we similarly drop the highest bid.

If these bidders, or even the majority of them, bid intelligently and really would have made a reasonable profit on the work at the price they bid, then some of them must certainly have a great deal to learn about methods and appliances to be employed in road grading, or else be sadly deficient in securing efficient work out of men and equipment.

It hardly seems probable that the latter of these two is the correct reason, there being so many contractors involved, and the only explanation that seems to us reasonable is that contractors are not yet sufficiently familiar with the most recent developments in methods and equipment for handling earth. As stated above, this letting was not an unusual case, but for several years past there seems to have been a more or less general but decided difference of opinion between contractors as to the most economical methods of earth handling.

It would appear, therefore, as though many contractors do not inform themselves sufficiently concerning how other contractors handle work; information which is available to most of them only through the pages of periodicals devoted to the engineering and construction features of public works. With almost monthly improvements in methods of carrying on contract work and appliances available, no contractor can be sure that he is up-to-date and performing his work in the most efficient and money-making manner without keeping himself informed by studying descriptions of contract work to be found in PUBLIC WORKS and other publications.

Motorization of Chicago's Street Bureau*

Operation of the tractor and trailer system saves money. Snow removal, using plows, trucks and snow loaders

OPERATION OF TRACTOR AND TRAILER SYSTEM

The initial installation of the tractor and trailer system was made in six of the 50 wards into which the city is divided, one on the south side, two on the west and three on the north. Four of the wards were selected because their respective ash and refuse teams were unable to rmove more than one load a day, the dumps available for disposal being from 8 to 9 miles distant. This made the cost of collection almost prohibitive. In the case of two wards chosen for experimental purposes on short hauls, the distances to their respective dumps were 3 and 5 miles.

There are, in the six wards, 8 tractors and trailer units, one tractor and three trailers in active operation forming a unit or train. For each unit there are three, and in certain wards six, trailers in reserve in order that collection may not be interrupted while tractor and train are in transit. Each tractor is manned by a chauffeur and conductor or helper. The trailers are horse-drawn, manned by a driver and helper and operated in specific districts. Three to five loads are collected daily. The trailers have a water-level capacity of 4½ cubic yards. The loads are heaped and receive a credit of 6 cubic yards at the dump. The engineers state that they carry more nearly 7 than 6 cubic yards.

The tractor-trailer trains make five or six trips daily on the 3-mile haul, four trips on the 5-mile.

*Continued from page 336.

and three on the 8- or 9-mile haul, travelling in the last instance a total mileage of from 48 to 54 miles daily. Each tractor picks up its trailers from their collection districts, or from a central point to which the trailers have been brought for that purpose, and hauls them to the dump. Where conditions permit, the tractor hauls the trailers into the dump, but where this is impossible, by reason of boglike condition, caterpillars bring them in.

The use of the caterpillar on the city dumps began in an experimental way. An appliance new to Chicago, termed a "bull-dozer," had been used in pushing ashes and refuse over the edge of abandoned stone quarries and reclaiming land along the Lake front. The appliance was in the nature of a road scraper projected at the end of a long pole, balanced on a two-wheel axle. A team was hooked to the whippletree which, when driven, pushed the refuse in front of the scraper into the fill. Then caterpillars were tried in place of the horses; first a 2½-ton, which was increased to a 5- and then to a 10-ton. It was found to be necessary frequently to pull mired loaded trucks out of the mud, requiring additional reserve power. The 10-ton caterpillar tractor was found to meet all requirements, and was adopted as standard. The caterpillar tractors are also used in pulling trailer trains into dumps when roadways are soft and wet.

The city now has one 2½-ton, five 5-ton, and three 10-ton caterpillar tractors. The 10-ton tractors consume 23 gallons of gasoline and 4 quarts of oil each in an 8-hour shift.

While a statement showing standardized cost of operation, maintenance and repairs cannot yet be made, it can be reliably stated that the unit cost of collection and disposal is materially lower than by any other method employed to date.

Based upon the test of the past year with eight tractors and 81 trailers, the city officials and engineers estimate that 142 tractors and 1,020 trailers are needed to cover the area within the city limits. The cost of these vehicles is placed at $2,342,000. Supplementing them, the city would still employ 452 teams to collect from the unimproved alleys of the city. With that equipment, it is estimated that a large saving would be effected. As previously stated, the city is purchasing 25 tractors and 159 trailers, and it is desired to install the complete service.

Last year the collection of ashes and refuse cost $2,570,190 and the hauling of garbage $638,125—a total of $3,208,315. It is estimated that the same service in quantity, but considerably better in character, could have been rendered by the tractors and trailers for $2,490,810, thus effecting a saving of $717,503. From this estimated annual saving of $717,503 alone, all the tractors and trailers required could be paid for in about 3 years.

SNOW REMOVAL

Area.—The territory covered in snow removal comprises the congested downtown region or "Loop"; the wholesale, warehouse, market and commission house districts; railway terminals; and the main arteries and car-line streets leading to the "Loop." It includes also the principal streets of practically all the business centers of the 50 wards into which the city is divided, each of which in area and population is a city in itself. Along the street railways of the city where the snow is not cleared from the pavements, it is removed to the extent of 50 feet where passengers get on and off, and from the entire intersection at prominent transfer points. Attention is also given to the removal of snow from in front of churches, schools and buildings generally where persons gather in large numbers. Newspapers are scanned for burial notices so that snow may be removed from places where funerals will take place. The snow is disposed of along the river front, in large sewers and on vacant lots.

Since the winter of 1918, which in snowfall and severity broke all records for the Chicago region during the existence of the weather bureau, the fall of snow has been greatly below normal. The depth of fall for the winter of 1923-24 was 26.9 inches.

The mechanical equipment used in snow removal are plows, trucks and loaders.

Snow Plows.—The Bureau of Streets has 25 snow plows, which are attached to the front of its street flushers. They are started when the snow has reached a depth of about 1½ inches and operated continuously thereafter until the streets included in the schedule are cleared. This places the snow in windrows ready for removal during and after the cessation of the storm. The plows clear for traffic the pavements of many through streets the environment of which does not require its removal. They are operated in batteries of two and travel at two speeds, from 4 to 6 miles per hour.

Trucks.—The snow is removed by trucks, hired from contractors and firms at the rate of $32.50 per day of 8 hours. The trucks are loaded by hand, by snow loaders, and by clamshell derricks mounted on trucks.

Snow Loaders.—Only once during the past winter was there sufficient snow at any time to make the use of the snow loaders practicable, and this snow, falling in a mild temperature that made it nearly slush and followed by a zero drop in temperature, did not furnish a favorable condition for their operation. In December, 1920, Chicago made an initial test of the first snow loader in the country. It ran 32 hours continuously without a breakdown. It averaged more than three cubic yards per minute, although the snow had not been plowed or piled. In its operation, a loader requires the services of an engineer and a helper, and two laborers at the plow end. It is self-propelled, self-loading, and end-discharging. A plow on either side of the conveyor belt gathers the snow from the pavement and places it on the conveyor, which loads it on to a truck moving in the rear of the loader. It is operated by a gas engine which consumes less than 12 gallons of gasoline and about a

quart of oil in an 8-hour shift. The city has four of these, bought at a cost of $4,900 each.

The clamshell derricks proved of value during the past winter, loading an 8-yard truck in about 3 minutes. They are operated by a separate motor from that of the truck. Six of these were employed, being hired from a contractor at the rate of $5 per hour.

The congestion of the streets is a great hindrance to the use of mechanical loaders, the hours from midgnight to early morning being the only time when they are comparatively free from traffic and parkings. As these are the hours when it is practically impossible to secure labor and yet when conditions are most favorable for removal, the loaders have exceptional value. Under favorable conditions there is great economy in the use of mechanical loaders over that of laborers with scoops.

During the period from January to the end of March, 1924, 55,889,487 square yards of pavements were cleared, 311,969 cubic yards of snow being removed. The cost of removal, including labor and motor vehicles, was $306,724; the cost of cartage being 34.4 cents per cubic yard.

An Unusual Curb

In carrying out a paving program at Mount Lebanon, Pa., which has cost over 1¼ million dollars, a curb was adopted different from that found in most cities. Instead of the customary square or slightly rounded edge, the curb extends 5 inches above the pavement, is 15 inches wide and 15 inches deep, while the face is given an 8-inch radius. This permits private owners to install drives to the garage without cutting into the curb, the automobile mounting readily over the rounded curb, while it is found that it offers sufficient barrier to prevent vehicles running over it on to the grass plots, and it is not subject to the chipping and other damage inflicted on curbs of the usual design. The engineers for this work were Douglass & McKnight of Pittsburgh.

Non-Uniform Waterworks Valves

An unfortunate result of the installation in a waterworks distribution system of both right-hand and left-hand valves was recently uncovered by an investigation by the engineers of the National Board of Fire Underwriters. They found in a certain Michigan city that the hydrants on one side of the main business street gave forth an abundant supply of water, while on the other side the flow was deficient. An inspection disclosed the fact that the hydrants on the latter side were connected to a main on which the gate valves opened in a direction opposite to that employed in the rest of the system and had been tightly closed when they were supposed to be open. The water department had no record of this condition, and the result of the discovery was an ample supply of water at good pressure from all the hydrants in the mercantile district.

Garbage Collection Statistics

Compiled from information furnished to Public Works by the officials of two hundred cities. Other information from the same sources was published in our October issue.

City	Garbage is collected from—What area?	How many miles of streets?	How many families?	Average length of haul of wagon after filling.	Average number of loads per day per wagon.	Average weight of load.	Cost of collection during 1923. C = by contract.	Items included in cost	No. of loads collected.
Alabama:									
Talladega	.....	40	2,200	¾ mi.	3 to 4	1,000 lbs	$6,000	Supt., labor, feed & material	3,000
Troy	1 mi.	6	200	¼ mi.	....	....	....	.....	....
Arizona:									
Miami	4 sq. mi.	20	1,500	1 mi.	5	2,600 lbs.	7,300	Wages, upkeep of equipment	3,650
Nogales	All streets	10	1,500	2 mi.	9	1½ ton	12,000C	Collect. garbage	....
California:									
Anaheim	Entire city	..	....	2 mi.	2	1 ton	8,000	Operation	....
Calexico	Entire city	20	2,000	1 mi.	2	3 tons	6,000	Labor, feed, repairs, ins.	2,600
Huntington Park.	City, mi. sq.	52	400	2 mi.	4	2 tons	5,000C	.....	1,300
Marysville	All over city	20	1,000	....	3	1½ ton	Nothing to city	Priv. collectors	....
Napa	100 acres	40	1,200	....	4	....	....	Priv. company	....
Palo Alto	whole city	40	3,500	1 mi.	2	3,500 lbs.	8,100	Labor, horse hire, etc.	1,800
Pittsburg	Entire city	15	....	1 mi.	....	....	....	Contract	....
San Bernardino	3 sq. mi.	60	....	¾ mi.	....	....	....	Contract	....
Santa Barbara	9 sq. mi.	100	2,200	1½ mi.	2	1½ ton	....	.....	....
South Pasadena	2 sq. mi.	40	4,000	1 mi.	3	2 tons	6,600	Labor	....
Ventura	All of city	40	1,000	3½ mi.	2	2,000 lbs.	None	.....	....
Visalia	2½ sq. mi.	40	....	....	....	....	....	Contract	....
Colorado:									
La Junta	Entire city	20	7,000 pop.	1 mi.	2	1,000 lbs.	....	Priv. collectors	....

GARBAGE COLLECTION—(Continued)

City	Garbage is collected from—What area?	How many miles of streets?	How many families?	Average length of haul of wagon after filling.	Average number of loads per day per wagon.	Average weight of load.	Cost of collection during 1923. C = by contract.	Items included in cost	No. of loads collected.
Connecticut:									
Hartford	17½ sq. mi.	160	31,000	G 2½ mi. A&R1 mi.	2 2	....	$253,163	Collection from rear of yards, and disposal.	364,260 cu. yd. 24,190 cu. yd.
New London	Entire city	60	....	G 3 mi. A&R1 mi.	3 8	....	11,300 30,000	Labor, supervision, upkeep	....
Delaware:									
Dover	.....	12	1,000	1 mi.	10 to 12	1¼ ton	....	.....	....
Dist. Columbia:									
Washington	50 sq. mi.	..	70,000	3 mi.	2	2,000 lbs.	266,338	Garbage only	61,651
Florida:									
Fernandina	.7 sq. mi.	10	600	¾ mi.	6	....	2,440	Drivers, helpers, truck repair & supplies	1,800
Key West	3 sq. mi.	50	8,000	1½ mi.	5	2½ tons	18,000C	.....	10,250
Ocala	Entire city	20	1,000	½ mi.	10	1,000 lbs.	....	.....	....
Tallahassee	City	45	1,800	½ mi.	4½	....	2,030	Collecting garbage & trash and sweeping gutters in business dist.	....
Georgia:									
Americus	1.76 sq. mi.	18½	3,680	4,000 ft.	7	1½ ton	2,857	.....	9,452
Cartersville	3.5 sq. mi.	..	1,800	1.5 mi.	10	1 ton	2,100	Labor, oil, gas, repairs	....
Fitzgerald	All of city	55	2,000	½ mi.	6	1,000 lbs.	2,000	Labor	2,000
La Grange	4 sq. mi.	20	1,800	1 mi.	6	½ ton	5,600	.....	....
Idaho:									
Lewiston	.....	..	1,200	1¼ mi.	2	3,000 lbs.	8,640C	All refuse from streets	1,000
Pocatello	Entire city	..	3,600	3 mi.	2	2,000 lbs.	8,600	Garb. & ashes by contract, & man at dump	432
Illinois									
Alton	Entire city	85	....	....	....	....	....	Contract	....
Blue Island	2 mi. sq.	..	3,000	2 mi.	4	....	9,000	Collecting garb. and ashes	....
Charleston	Business dist.	..	....	¾ mi.	2 or 3	1,000 lbs.	....	.....	....
Chicago	.....	Alleys	582,533	5 mi.	2	3,000 win. 6,000 sum.	638,125	Labor, teams, boat hire and handling at loading station	50,020
Cicero	5¾ sq. mi.	50	12,000	2 mi.	2	....	75,000	Collection; also street cleaning	9,000
Hinsdale	1 sq. mi.	40	1,000	1 mi.	2	1,500 lbs.	....	.....	....
Kankakee	All of city	2	....	10 to 12 blks	4	1½ ton	19,957	All garbage and rubbish	7,053
La Grange	.....	35	1,700	½ mi.	8	6,000 lbs.	21c cu. yd.	Priv. collectors	....
Oak Park	Entire town	100	10,000	1 mi.	5	1 ton	51,560	Rubbish, garb., street sweepings	12,834 G 19,596 A&R
Peru	All of city	..	....	1 mi.	....	....	1,500C	.....	....
Pontiac	All of town	25	1,200	¾ mi.	4	1 ton	2,520C	.....	8 daily
Quincy	City limits	48	....	2½ mi.	4	1,500 lbs.	12,500C	.....	....
St. Charles	.....	7	175	1 mi.	6	900 lbs.	480	.....	....
Sterling	All of city	..	....	1¼ mi.	....	....	2,868	Garbage & ashes	....
Summit	1 sq. mi.	20	900	½ mi.	4	1 ton	3,000	2 men's salaries & maintenance	1,000
Indiana:									
Bedford	.....	60	700	3½ mi.	4	2 tons	1,800	.....	....
Decatur	City limits	30	1,500	¾ mi.	3 to 4	1,000 lbs.	720C	Garbage	....
Hartford City	.....	..	....	1 mi.	6	½ ton	....	Priv. collectors	....
Huntington	1½ mi.	20	....	1 mi.	3	2,400 lbs.	6,100	Labor	1,566
La Porte	Entire city	..	2,100	1 mi.	5	½ ton	....	.....	....
Mishawaka	.....	..	500	1½ mi.	8	1,500 lbs.	....	.....	....
Muncie	12 sq. mi.	170	9,000	1 mi.	2	3 tons	$25 per cap.	Garbage	15,416
Noblesville	Entire city	20	500	½ mi.	....	....	1,500C	.....	tons
Shelbyville	.....	31	12,000	....	....	....	2,700C	Garb. collection & disposal	1,200
Tell City	.....	4	700	½ mi.	10	500 lbs.	....	Team & 2 men	....
Wabash	3.89 sq. mi.	54.55	....	3 mi.	2	4,000 lbs.	1,500	Salary, repairs	2 a day
Winchester	.....	10	1,000	¾ mi.	....	....	....	Priv. collectors	....
Iowa:									
Carroll	Large portion of res. dist.	18	800	1 mi.	3	....	....	.....	....
Cedar Rapids	Entire city	..	8,000	2 mi.	3	1,600 lbs.	17,473	Collection, gas, oil & repairs	5,022
Ottumwa	Entire city	146	5,000	¾ mi.	6	3,000 lbs.	4,079	Team	1,036
Kansas:									
Abilene	Alleys	18	200	¾ mi.	1	....	....	Priv. collectors	....
El Dorado	Entire city	30	....	1½ mi.	....	....	....	Contract	....
Horton	Bus. dist.	½	None	2 mi.	1	1 ton	300	Ashes & rubbish, priv. collector	300
Osawatomie	.....	..	500	....	....	....	....	.....	....
Salina	Entire city	60	300	2 mi.	....	½ to 1 ton	....	Priv. collectors	....
Kentucky:									
Catlettsburg	City limits	10	2,000	1½ mi.	....	....	....	Priv. collectors	....
Ludlow	Entire city	5	1,200	1 mi.	6	800 lbs.	5,650	Salaries & feed	....
Mayfield	Bus.houses only	2	....	1 mi.	6 or 7	1½ yd.	375	.....	500
Paris	3½ to 4 mi.	..	....	½ mi.	4 or 5	....	5,000	Labor, feed and repairs	....
Somerset	Business dist.	5	100	1 mi.	1	1 ton	750	Salaries	300
Louisiana:									
New Iberia	Entire city	15	....	1½ mi.	4 to 5	....	1,800	Mules, wagons and men	....
Maine:									
Bangor	Residence dist.	50	3,000	2 mi.	....	2 ton	12,000C	.....	....

GARBAGE COLLECTION—(Continued)

City	Garbage is collected from—What area?	How many miles of streets?	How many families?	Average length of haul of wagon after filling.	Average number of loads per day per wagon.	Average weight of load.	Cost of collection during 1923. C = by contract.	Items included in cost	No. of loads collected.
Massachusetts:									
Arlington	5 sq. mi.	75	6,000	1 mi.	2	....	18,568	.....	498
Cambridge	6 sq. mi.	108	20,000	2 mi	2	1 ton	102,000	All	7,500
Easthampton	3 sq. mi.	20	2,000	1½ mi.	5	....	3,800C	Collection and cost of cans	....
Framingham	Entire town	80	....	....	....	....	3,600C	Col. & disposal	....
Haverhill	.....	80	40,000	....	....	....	....	Contract	....
Hudson	½ town	25	....	3 mi.	....	....	....	Contract	....
Mansfield	1 sq. mi.	10	....	1 mi.	2	½ to 1 ton	1,200	.....	....
Provincetown	5 mi.	5	300	2 mi.	10	1 ton	600	Rubbish	....
Reading	Entire town	53	8,000	....	....	....	....	Contract	....
Southbridge	1½ mi. fr. cen.	30	3,000	1 mi.	2	1½ ton	Garb. $2,400 Rubbish 400	Labor, maintenance of wagons and trucks	912
Waltham	4 sq. mi.	..	....	1 mi.	3	1,400 lbs.	20,193	Labor, teams, trucks & maintenance, includes clean'g of transfer platform	....
Whitinsville	.....	15	1,800	2½ mi.	2	....	1,500C	.....	....
Michigan:									
Adrian	2 sq. mi.	49	2,800	2 mi.	4	3,000 lbs.	2,900C	.....	....
Albion	Entire city	25	1,000	2 to 3 mi.	....	....	....	Private collector	....
Alma	6 sq. mi.	52	1,800	½ mi.	8	4,000 lbs.	1,655	Rubbish & ashes only	2,700 cu. yd.
Ann Arbor	2 sq. mi.	100	4,500 to 5,000	3 mi.	3	....	16,200C	.....	15 to 18 tons da.
Benton Harbor	3½ sq. mi.	60	4,000	1 mi.	....	....	G 4,700C A&R 4,500	Garbage, ashes and rubbish	....
Hancock	.....	..	1,200	1 mi.	8	....	4,000	Garbage, rubbish & ashes	....
Hastings	6 blocks	..	108	1 mi.	....	....	....	.....	....
Highland Park	2 sq. mi.	90	55,000	4½ mi.	4	2½ ton	48,000	All	....
Houghton	½ sq. mi.	12	1,000	½ mi.	3	1 ton	5,000	Men and teams; man at dump	900
Ludington	3 sq. mi.	20	3,000	2 mi.	12	....	2,800	Garb, wages, &c.	....
Marquette	Entire city	42	....	3 mi.	5	2 tons	....	.....	....
Mt. Pleasant	4 sq. mi.	30	1,000	1½ mi.	6	4,500 lbs.	....	Priv. collectors	....
Sturgis	All residential	25½	1,400	1½ mi.	1	3,000 lbs.	2,000	Garbage collection only	....
Wakefield	City limits	5	562	1½ mi.	6	....	115	Labor only (private collection)	....
Minnesota:									
Austin	2 sq. mi.	9	400	1 mi.	5	2 tons	2,000	Driver & team & helper, garbage postal cards and postage	1,500
Chisholm	Entire village	3	2,000	¾ mi.	12	600 lbs.	....	.....	....
Minneapolis	50 sq. mi.	..	92,000	7.5 mi.	....	1 ton	202,376	Col. & transfer	32,488
St. Paul	50 sq. mi.	600	....	2 mi.	1 wag. 2 trail.	2 tons	77,539	.....	13,999 tons
Thief River	Entire town	6 mi.	350	¼ mi.	....	1 ton	850	1 man & team	312
Mississippi:									
Vicksburg	.....	..	....	3 to 5 mi.	3 to 6	1 to 3 tons	12,500	Salaries, labor, stock, feed, etc.	....
Water Valley	.....	40	1,000	½ mi.	8	300 lbs.	3,500	.....	10,000
Montana:									
Havre	.....	15	....	1 mi.	....	....	4,000C	.....	....
Helena	1½ sq. mi.	30	....	½ mi.	2	....	12,000	Wages, feed, repair, etc.	1,800
Nebraska:									
Beatrice	.....	Over 30	Over 300	1½ mi.	4	1½ ton	....	.....	....
Chadron	1½ sq. mi.	20	5,600 pop.	1 mi.	4	3,000 lbs.	3,200C	.....	....
New Hampshire:									
Nashua	City	70	....	....	....	....	900	.....	....
New Jersey:									
Asbury Park	1¼ sq. mi.	40	3,500	2 mi.	....	....	29,000C	Garbage, ashes and rubbish	....
Carlstadt	¾ sq. mi.	11	785	¾ mi.	7	6,000 lbs.	1,600 (8 mo.)	Hauling and spreading	571 (8 mo.)
Freehold	¾ sq. mi.	20	1,000	3 mi.	2	3 tons	3,300C	.....	....
Phillipsburg	Entire town	30	5,000	....	....	....	11,000C	.....	....
Somerville	Entire town	12	2,500	½ mi.	6	2 tons	5,912C	Col. & disposal	1,900
Summit	5 sq. mi.	50	2,500	1 mi.	1	2 tons	30,000C	Ashes, garbage and refuse	1,100
New Mexico:									
Santa Fe	City limits	25	1,000	½ mi.	4	1 ton	3,300	Garbage & ashes	1,500
Tucumcari	City limits	12	750	2 mi.	3	1,200 lbs.	1,600	Salary $1,200; truck, $400	....
New York:									
Albany	10 sq. mi.	..	30,000	4 mi.	2	4 tons	....	.....	....
Buffalo	Entire city	653	....	4 mi.	2	5 tons	1,005,913	Ashes, garb. and refuse collection	....
Depew	3 sq. mi.	15	1,500	2 mi.	7	2 tons	5,100	Labor & truck'g	....
Endicott	.....	40	2,700	¾ mi.	6	....	6,237	Labor in ash & garb. collection	....
Glen Cove	City limits	25	....	1½-2 mi.	....	....	15,000C	Col. & disposal	....
Gloversville	4 sq. mi.	50	....	2½ mi.	....	....	5,150C	Garbage only	....
Johnson City	1,200 acres	25	....	....	8	3 tons	$32 per dayC	.....	....
Johnstown	Entire city	30	10,600 pop.	1½ mi.	6	5,000 lbs.	3,600C	Garbage	....
Lackawanna	6 sq. mi.	..	20,000 pop.	½ mi.	4	....	15,000	All	20 daily
Lockport	3½ sq. mi.	110	4,200	1½ mi.	4	4,000 lbs.	10,873C	Garbage, ashes & rubbish & man at dump	4,000
Medina	Entire village	..	1,500	....	2	....	1,150	.....	....
Ossining	.....	27	....	....	....	....	14,000C	Ashes, rubbish & garbage	....
Tarrytown	Entire village	20	1,200	1 mi.	5 or 6	2 tons	7,800C	Ashes, garbage, paper, etc.	....
Watertown	Entire city	70	10,000	2½ mi.	8	6,200 lbs.	6,000C	Total cost to city	
Wellsville	.....	25	400	1 mi.	....	1 ton	50	Rubbish once a year	25

GARBAGE COLLECTION—(Continued)

City	Garbage is collected from—What area?	How many miles of streets?	How many families?	Average length of haul of wagon after filling	Average number of loads per day per wagon.	Average weight of load	Cost of collection during 1923 C = by contract.	Items included in cost	No. of loads. collected.
North Carolina:									
Henderson	1½ sq. mi.	25	6,000	¾ mi.	8	500 lbs.	3,600	Garbage only	2,500 to 3,000
Ohio:									
Bellevue	Entire city	..	....	....	....	....	....	.....	....
Cincinnati	Entire city	..	....	....	....	....	183,756	Ashes & rubbish, labor & overhe'd	60,479
Greenville	Entire city	15	....	½ mi.	4 to 6	1,500 lbs.	....	.....	....
Marion	3½ sq. mi.	60	5,000	2¼ mi.	1	1¾ ton	....	Priv. collectors.	....
Portsmouth	City limits	45	9,500	¾ mi.	6	1½ ton	15,800C	.....	1,836
Oklahoma:									
El Reno	2 sq. mi.	30	2,000	1 mi.	3	3000 lbs.	5,000	Priv. collectors	3,000
Enid	Several mi.	..	2,000	From 1 mi. up	1 & 2	2,000 lbs.	10,000C	Garbage & trash	3,000
Shawnee	.....	50	900	....	4	....	....	.....	....
Oregon:									
Oregon City	City limits	18	1,500	1 mi.	3 to 5	700 lbs.	500	6 clean-up days & rent of dump	18 to 24
Pennsylvania:									
Ashland	.....	..	....	....	....	....	2,850	Ashes	....
Blairsville	½ of city	15	415	2 mi.	....	....	....	.....	....
Dormont	1 sq. mi.	20	2,500	5 mi.	2	1½ ton	$8 per tonC	.....	....
E. Stroudsburg	Entire boro	36	2,000	3 mi.	5	1,500 lbs.	2,100C	.....	....
Erie	20 sq. mi.	250	25,400	2 mi.	{ wagons 2 { trucks 3	2,300 lbs. 3 tons	47,960	Garbage	....
Ford City	9 mi.	2	....	2 mi.	12	....	1,784	.....	....
Freeland	1 sq. mi.	20	....	....	....	....	....	.....	....
Grove City	4 sq. mi.	18	1,500	2 mi.	2	3 tons	4,000C	Garb. & rubbish	1,000
Lansdowne	1½ sq. mi.	30	1,200	6 mi.	2	5 tons	1,500C	Garbage only	250
Norristown	.....	30	....	5 mi.	2	4 tons	10,800	Contract, $9,000; inspection $1,800	....
Northampton	.....	3	800	1½ mi.	2	1 ton	250	.....	....
Pen Argyl	.....	10	....	1 mi.	....	....	....	.....	....
Philadelphia	129 sq. mi.	1,500	over 400,000 houses	1 to 6 mi.	2	1.6 to 1.9 tons	803,887	Entire cost garbage collection	112,000 city 23,569 private
West Pittston	1½ mi.	16	....	1 mi.	....	....	....	Priv. collectors	....
Rhode Island:									
Providence	18.3429 sq. mi.	271.45	242,299 pop.	....	....	....	105,000C	Collection only	....
South Carolina:									
Chester	3 sq. mi.	15	900	1 mi.	6	....	2,500	Labor, transfer and repairs	....
Laurens	Entire City	30	796	1 mi.	10	1 ton	....	.....	....
Sumter	1 mi. radius	40	2,500	1 mi.	7	1½ ton	....	.....	....
South Dakota:									
Rapid City	Entire town	59	....	2 mi.	4	....	3,200	.....	....
Tennessee:									
Dyersburg	Business dist.	¾	....	½ mi.	12	300 lbs.	900	Only collection	....
Johnson City	4 sq. mi.	30	3,700	2½ mi.	13	1½ ton	18,432	Refuse collection & street cleani'g	....
Kingsport	2 sq. mi.	10	1,500	....	{ wagon 10 { truck 15	....	3,750	Collect'n & burning	5,400
Memphis	25.3 sq. mi.	345.27	51,653	3½ mi.	7½ cu.yd.	800 lbs.	136,400	All collection cost, including night soil	garb. 45,044 ashes 93,573
Morristown	.....	18	....	....	1	4 tons	1,800	Street cleaning	1,000
Texas:									
Belton	15 blocks	1	....	½ mi.	....	1,000 lbs.	1,200	Wagons & men	600
Dallas	25 sq. mi.	400	50,000	3 mi.	3	1,800 lbs.	217,343	All	421,463
Mt Pleasant	1 sq. mi.	54	550	....	3	3,500 lbs.	....	.....	900
Utah:									
Brigham	Bus. dist.	1	1,500	2 mi.	2	1,500 lbs.	930	Gathering & disposal of garbage and removal of street cleanings	800
Ogden	Entire city	218	15,000	3 mi.	3	2,500 lbs.	12,000C	.....	4,000
Vermont:									
Burlington	Entire city	60	....	2 mi.	2	3,000 lbs.	8,000	Labor, material & maintenance	2,400
Virginia:									
Clifton Forge	4 sq. mi.	14	1,400	1 mi.	9	3,000 lbs.	4,000	Labor & fuel	....
Harrisonburg	1 sq. mi.	10	1,600	¾ mi.	12	1 ton	3,000	Labor & upkeep	624
Newport News	5 sq. mi.	..	7,000	1 mi.	4	3,000 to 1,600 lbs.	20,100	Collection of garbage & night soil	20,000
Norfolk	35 mi.	250	3,200	2 mi.	4	....	330,286	Collect., disposal, burning on dump garbage, trash, paper, misc. sweepings	250,675 cu. yd.
Pulaski	¼ town	20	1,000	½ mi.	....	....	1,500	Team & man	....
Richmond	25 sq. mi.	382	36,600	1½ mi.	4	2,000 lbs.	149,283	Labor & equipment deprec.	325,008 cu. yd.
Roanoke	9.5 sq. mi.	185	10,000	2 mi.	6	1,200 lbs.	41,713	Trash & garbage collection & disposal	25,787
Washington:									
Walla Walla	4 sq. mi.	..	5,000	2½ mi.	....	....	4,200C	Garbage only	....
Wisconsin:									
Kenosha	6½ sq. mi.	117.20	9,430	1¾ mi.	7	3,855 lbs.	41,876	Service, up keep of equip. & interest on invest. Also services of 2 men at dump	11,570
Oshkosh	Entire city	87	5,000	2 mi.	10	....	3,800	Contract	....
Wauwatosa	5 sq. mi.	..	....	1 mi.	4	....	{ 7,000 { 6,000	Garbage collect. Collect. of ashes only	
Wisconsin Rapids	10 sq. mi.	45	2,000	1 mi.	4	....	5,000	Collect., dumping & covering	2,500

Swamps on Watersheds

A 15-acre swamp located a short distance from the reservoir that supplies water to the town of Southington, Conn., was found to be the cause of high color in the water, according to the monthly publication of the State Department of Health, which states that this ditch was drained with very satisfactory results, the color being almost entirely eliminated. In addition, the runoff was considerably increased.

In draining the swamp a ditch was laid out completely surrounding it, effort being made to find solid bottom, the best grade and the location where the least work would be necessary. The swamp was enclosed by higher land and several springs around its edges were intercepted and led into the drainage ditch.

In excavating the ditch hand labor was tried, but found extremely slow and expensive, 2,075 feet that were dug by hand having averaged 35c a foot. The method was then changed to blasting, under the charge of a practical man with abundant experience in this work. Charges of about one-half stick were placed about 3 feet apart, each with a detonator, and were exploded with a battery, about thirty to a shot. Where stumps and stones were encountered, heavier charges were used. This method was used for 4,260 feet of ditch and cost an average of 11.3c per foot for blasting and about 10c additional for cutting brush and cleaning the bottom and sides of the ditch. The ditch so formed was considerably larger than the section which was hand dug, but cost only about two-thirds as much.

Welding Cast-Iron Pipes

Welding cast-iron pipes, both in making joints and in repairing cracks, is said to have been brought to a point where it is commercially practicable. In several instances it has been used for repairing breaks in large pipes which are in service, thus avoiding the delay and expense involved in removing the cracked pipe and substituting a new one. It has also been used as a substitute for lead-filled bell and spigot joint for gas pipe. Recently about a quarter of a mile of cast-iron pipe for high-pressure gas has been laid with welded joints on Long Island, the process having been developed by the Linde Air Products Company and the Union Carbide & Carbon Research Laboratories, Inc.

The standard methods of cast-iron welding could not be used in welding joints chiefly because of the difficulty and expense of preheating the joint, and a process was developed of welding such joints with a standard bronze rod and commercial flux using the following procedure: The square ends of the pipe are butted together and a ridge of bronze is built up with an oxy-acetylene flame, extending entirely around the pipe like a collar. The temperature required is far below the melting point of cast-iron, and in fact only a minute film of the iron is alloyed with the overlying bronze—much like the tinned surface under a brazed or soldered joint. The result may be described as a bronze collar shrunk around the pipe and attached thereto by an alloyed layer. Such a joint was tested for strength, and it was found that the metal did not break away from the collar and, in fact, that breaks and cracks stopped within a half-inch of it.

It is said that bronze welding of cast-iron pipe is not difficult, a pipe welder of average experience being able to do satisfactory work after a reasonable period of instruction.

In laying the gas pipe line above referred to, 12-foot lengths of pipe were welded into 24-foot lengths at the central distributing point. These double lengths were then suspended by blocking above the trench, and in one case fourteen lengths were welded together while so suspended, giving a continuous piece 168 feet long; shorter lengths being used at other points where subsurface obstructions determined the length. It was then lowered into the trench, supported at every fourth or fifth joint. The several lengths were then welded together in the trench. However, the size and depth of bell hole required makes welding here more difficult and expensive than when it is supported well above the bottom.

Yarning Leadite Joints

In a discussion on the use of lead substitutes, at the seventeenth annual convention of the Indiana Sanitary and Water Supply Association, the most important requirements for success accented by those narrating experiences were proper melting, a high pouring gate, and proper yarning.

Concerning the latter, L. A. Geupel, director of the Water and Sewerage Department of the Indiana State Board of Health, said: "In yarning a joint, it appears that dry braided hemp is used to an advantage. The yarning does not have to be made as tight (as for lead joints), inasmuch as the material is slightly thicker and lighter than molten lead and will not carry inside the pipe so readily."

Geo. McKay, Jr., representing the Leadite Co., said: "We always recommend that the joints be yarned tightly to insure yarn being driven back against the bell or hub shoulder, and thus make sure of an even depth and thickness of joint and eliminate whiskers and loose ends of yarn from protruding and causing leaks. The use of braided hemp makes it very easy to get an even thickness of joint. There is no waste and it permits making up the joints rapidly."

Dow R. Gwinn, president and manager of the Terre Haute Water Co., said: "Where oily yarn is used the oil greases the pipe and prevents bonding. They told us we were not using the right kind of yarn and sold us braided packing, which in the end is not expensive. We use just one strand."

J. W. Toyne, of South Bend, said: "We use braided square packing. The over-all cost at the end of the season I believe is lower than in using the three-shred or twisted."

Separate Sludge Digestion at Oneida, N. Y.

Adopted because of difficulty of deep excavation for Imhoff tanks. Sludge tank has six months' sludge capacity. To serve population of ten thousand.

By Henry W. Taylor*

A new intercepting sewer, pumping station and sewage disposal plant has recently been put into operation in Oneida, N. Y., and is of special interest because of its history, the final layout and the cost at which the work was completed.

For years the city of Oneida has discharged its sewage without treatment into Oneida creek through two separate outfall sewers. The flow of Oneida creek, due to its shed and the diversion of water for the canal feeder, is not adequate during several months of the year to properly dilute the raw sewage and a nuisance in the lower sections of the stream resulted. This condition does not, however, extend over a long period, and even during this period refinements of sewage treatment are not necessary.

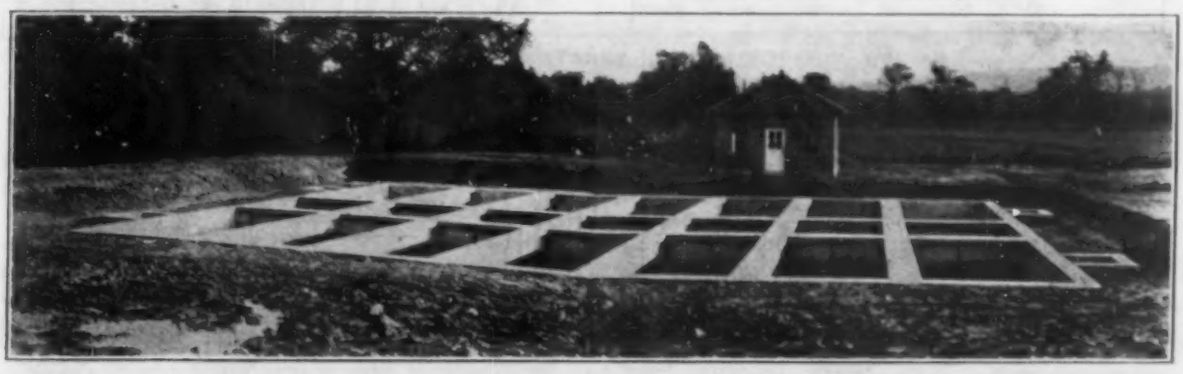
In 1913, plans were prepared for the construction of a sewage disposal plant. These plans included an intercepting sewer, pumping station, Imhoff tanks, sprinkling filters and sludge drying beds. The matter of filtration was later taken up with the State Department of Health and permission granted to omit the construction of the sprinkling filters until such time as their use proved imperative. Ten years later, in 1923, the city decided to construct a disposal plant and asked for revision of plans, including any adjustments that would naturally follow from the omission of the filters. The original plans included the filters and provided for pumping to a level which would supply head to operate them. With the omission of the filters for the time being, and as the date of their installation was problematical, it seemed uneconomical to pump for the filters for years before they were actually installed. The new plan consequently reduced the pumping head and the water level in the settling tanks by about seven feet, and included provision for secondary pumping, to be installed to supply the filters when they are constructed, if ever.

This introduced the second problem—the lowering of the tanks to suit the lowered water level in them. If the Imhoff tank was to be retained, the depth of the tank could not be reduced and the bottom of the tanks would necessarily be lowered seven feet farther into the ground. Preliminary soundings in the disposal area showed a very unsatisfactory subsoil condition, including quick sand, gravel and water lying in coarse strata.

It was, therefore, decided to change the type of tank and use plain settling tanks with sludge digestion tanks separate therefrom, instead of underneath the flow section as in the Imhoff type of construction. Two settling tanks were designed with a separate sludge digestion tank lying between them, so that both settling tanks could be sludged into the middle tank. The sludging is accomplished by raising the water level in the settling tanks about five feet above the normal level, providing a differential head between the settling and sludge tanks. When the sludge tank is blown off onto the sludge bed, the same condition is established between it and the bed. The water level is raised by closing the outlet shear gates of the tanks and increasing the speed of the pumps to suit the greater lift. For this purpose, the pump motors are variable speed motors with hand speed control, and the pumps were designed to yield their rated capacity at either head with the necessary speed change.

As far as sewage disposal processes are concerned, the sludge digestion is effected in a separate tank from that in which the sedimentation of the sewage takes place. The bottoms of the settling tanks are divided into squares, each square has a hopper bottom with sludge piping to the middle tank. The sewage in the settling

*Consulting Engineer, New York City.



GENERAL VIEW OF SEWAGE TREATMENT PLANT OF ONEIDA, N. Y.

tanks is eleven feet deep for working conditions, but the walls were carried up in all tanks six feet above the normal level. This elevation of the walls is also required by the flood water conditions of the stream, so that this expense was not chargeable to sludging.

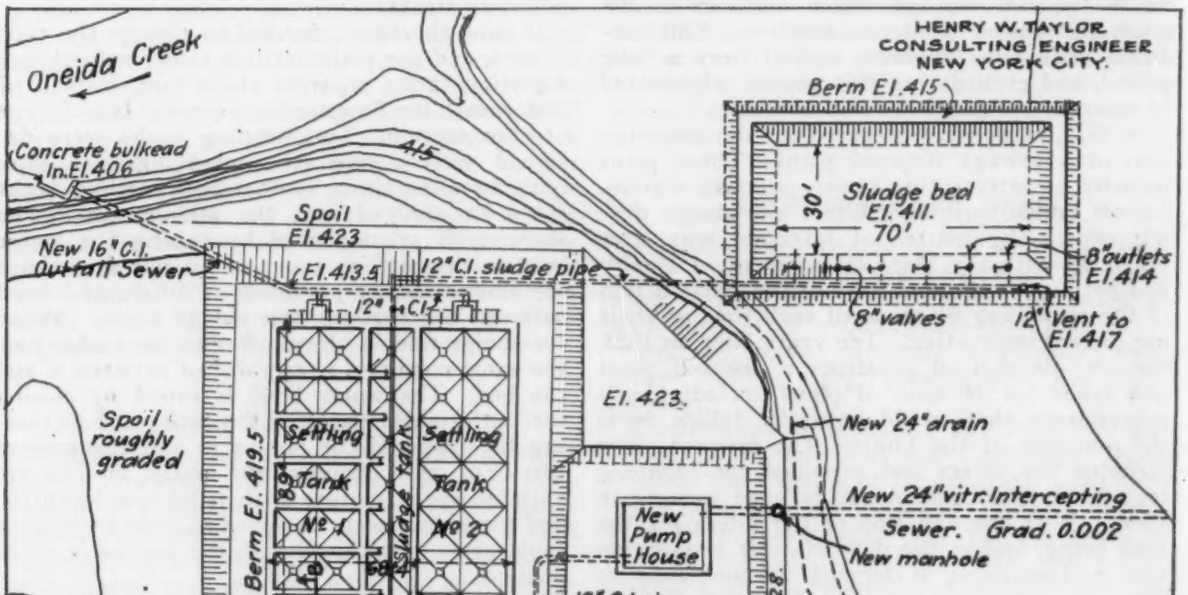
The sludge tank has a capacity of six months for the estimated settled sludge in the settling tanks and will be blown off twice a year to the sludge bed. The sludge drying bed can therefore consume six months in drying a discharge of sludge. The dried sludge will be removed from the bed and used for fill on low sections of the city plot, on which is also dumped the refuse collected from the city.

The supernatant liquor from the sludge tank will be drawn off slowly and discharged into the inlet of the settling tanks and be mixed with the fresh incoming sewage. In blowing off the fresh sludge from the settling tanks, opportunity can be provided for the mixing of this fresh sludge with the partially digested matter. The English operators claim that this operation is necessary and eliminates the major sludge smells.

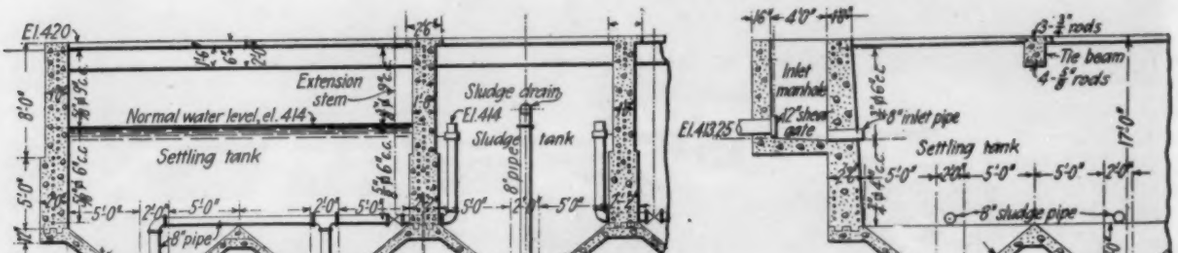
The work was completed for $57,805 and included 1,350 feet of 24-inch intercepting sewer, several special manholes on this line, a four unit pumping station, each unit having a capacity of 500 gallons per minute, a force main to the tanks, two settling tanks, one sludge tank, a sludge bed and a new cast iron outfall sewer to Oneida creek. The population served by the plant was taken at ten thousand people and the unit cost for this small plant was $5,800 per thousand inhabitants served.

The accompanying illustrations show the essentials of the design.

In the general plan is shown a top view of the left



GENERAL VIEW OF SEWAGE TREATMENT PLANT OF ONEIDA, N. Y.



SECTIONS OF SETTLING AND SLUDGE TANKS.

hand settling tank and a bottom plan of the sludge tank and the right hand settling tank. The tie beams shown in the top view are flanged to afford width for the operator to walk along the different sections of the tanks and work at the sludge from above. The settling tanks are two hoppers wide, while the sludge digestion tank is only one hopper wide. The inlets and outlets are controlled by shear valves and five pipe inlets to the tanks are provided.

The new intercepting sewer brings the sewage to the pumps, which deliver the screened sewage to the tanks through the sixteen-inch force main indicated. There is another inlet from the force main to the sludge tank which is not shown on the drawing, this inlet being used to raise the sludge tank water level during times of sludging to the sludge bed.

Section A-A shows a cross section perpendicular to the flow of sewage. Section of the sludge digestion tank is shown at the left, the right hand settling tank not being shown. The sludge pipes are supported from the bottom on special leg castings. The ends of the slude pipes were turned up in the sludge digestion tank so that the operator can see the character of the sludge which is being discharged. It may be found that better results will obtain by changing this lay-out, removing the risers and installing a forty-five degree fitting, looking down, near the wall of the sludge tank, so that the new sludge will be discharged downward and stir up the partially digested sludge already there and form a mixture of the new and old sludge.

Walls are reinforced in the middle and one-half of the thickness of the wall will work with the reinforcement for one hydrostatic condition and the other half will come into play for the opposite hydrostatic pressure. It is probable that the sludge will have to be pushed or jetted from the slopes of the hoppers and this work can be done by the operator from the walks around each set of hoppers. The sections show the extended side walls of the tanks which provide for the raising of the water level for sludging and prevents inflow of flood waters of the creek.

The matter of separate sludge digestion tanks is receiving considerable attention in England and the United States. In the Birmingham district, England, a report on several such plants has been made and was referred to in these columns. Where the sludge disposal problem is not complicated by limitation of areas available for the purpose or undesirable proximity to settled districts, the separate sludge digestion tank will be found structurally cheaper than the Imhoff type, which generally has to be installed under trying subsoil and water conditions. At Oneida, the city owns a considerable area all around the disposal area, which is used for other municipal purposes such as refuse disposal, etc., and is well away from prospective building lots.

The writer worked as consultant with the city engineer, J. M. Hutton, in the design and construction of the plant. The contractors were Rock Bros. and Griffin. The pumps used were of American Wells Works manufacture, with Westinghouse motors.

MOTORS AND SWITCH BOARD, ONEIDA, N. Y.

Water Supply Increase with No Capital Investment

This was the title of a paper read before the New England Waterworks Association by Frederick E. Beck, chief engineer of the Consolidated Water Company of Utica, N. Y., in which he told in detail how that company had met a threatened water shortage by the expenditure during six years of $16,622 in operating costs, in place of a construction program which would have involved the expenditure of over a million dollars and the payment of nearly $293,000 in interest during the six years in question.

The company obtains its supply chiefly from West Canada creek. Plenty of water was available at the source, but in 1917 that delivered by the 21 miles of supply main was little more than the consumption, and as the demand was rapidly increasing it was apparent that immediate action of some kind was necessary. Alternative plans were considered of booster pumps to increase the discharge through the existing pipes, or the building of duplicate mains. The latter was considered preferable and a program of progressive construction was decided upon calculated to meet the estimated increase in consumption year by year. This program called for the expenditure of $375,000 in 1918 and smaller amounts during the succeeding five years, when the total cost would have amounted to $1,099,000.

Meantime a pitometer survey was made of a typical section of the city to learn how much of the water was being wasted and this was found to be so considerable that if the leaks could be located and stopped, the construction program could be delayed for one or two years. By the end of the summer of 1919 the company had located and repaired leaks totalling 1,700,000 gallons per day, and by the end of 1920 a leakage of an additional 800,000 gallons per day was stopped. Since then leakage surveys have been

a regular feature, and the company now accounts for 86% of the supply, the system being fully metered.

However, it was found that, although the waste was being reduced, the supply delivered by the supply mains was also constantly decreasing, having fallen off 1.8 million gallons per day during a period of six years, or nearly 15%, and in spite of the stoppage of practically all leaks, it would still be necessary to increase the supply by building additional mains not later than 1922. A study was made of the supply main by means of the pitometer, and it was found that the value of C in Hazen & Williams' formula was but 90. The interior of the pipe was examined, and although there were no obstructions or considerable tuberculation, the inside had a thin coating of slimy material, and it was decided to clean it to increase its carrying capacity. In October, 1922, it was cleaned by the National Water Main Cleaning Company, and measurements made one month later showed that the value of C had increased to 131 and that the supply delivered by the main had been increased by 3.8 million gallons per day.

At the end of 1923 the company found the relation between the supply delivered by the main and the consumption to be practically what it would have been had they carried out the construction program contemplated in 1918. In other words, by the expenditure of $16,623 for pitometer survey and waste reduction and the cleaning of the mains, it had postponed for six years the necessity of any capital expenditure and thus saved the carrying cost during that period, which cost at 7% would have amounted to $292,895. At the date of writing this paper, September, 1924, the company felt that it had exhausted all means of postponing the capital investment and was then making plans to begin the construction program during the year 1925.

National Employment Agency

The Russell Sage Foundation has recently made public a report based upon a five-year study of labor employment conditions throughout the United States and also Canada and England, and states as its conclusion from a study of the information so obtained that present methods are inadequate to the needs both of industry and of the workers, and it recommends the establishment of a nation-wide free employment service to be operated jointly by federal, state and local governments.

Its major reasons for reaching this conclusion are three in number: 1. That all the existing employment agencies combined meet only a part of the need, leaving the demands of many important sections of the country and some important industries entirely undeveloped. 2. An employment system, national in scope, is necessary to reduce unemployment and at the same time give employers the maximum assistance in securing labor. None of the existing non-government agencies offer sufficient prospects of development along these lines. 3. Absolute impartiality is necessary, particularly during strikes, and this cannot be secured through the existing agencies.

Several hundred pages of the report are devoted to discussing methods of organizing and administering a national employment service.

Pan American Standardization

The Peruvian Government has invited the twenty-one republics in the Pan American Union to a conference on standardization to be held at Lima, Peru, beginning December 23rd. Sixty technical and trade organizations in the United States have been invited to send representatives to meet with those of similar organizations from the other countries. The American Engineering Standards Committee has assumed an important part in preparing for the work among the manufacturing industries of this country.

No attempt will be made to adopt actual standards at this meeting, but it is believed that a substantial basis for inter-American standardization can be laid and that some more definite action can be had at a second conference to be held within the next two years.

To Blast Colorado Snow Drift

According to an article in "Colorado Highways" a trial will be made next spring of the use of an explosive for blowing out snow drifts 15 to 25 feet deep in a Rocky Mountain highway.

"Incased in a tube of lead, a ribbon of powerful T. N. T., known as a cordeau fuse, has been stretched along the trail of the Fall River road in the Rocky Mountain National Park west of Loveland.

This fuse is buried under snow drifts ranging from 15 to 25 feet deep on both sides of the Fall River pass, and in the spring the drifts of snow will be blown from the trail by this powerful explosive.

"This is something new in the work of the park service. Heretofore the snow has been bucked and scraped from the mountain pass roads each spring. This has been the hardest and most expensive task the park service has had to handle.

"Cordeau is set off by a blasting cap, so that its entire length explodes at the same instant. Fifty-pound boxes of 20 per cent dynamite were placed at 20-foot intervals in one of the worst drift locations along the road. Each box was then opened, a box of Cordeau strung between them, after which they were sealed again.

"The free end of the Cordeau is securely fastened 25 feet high, on a steel snow gauge pole. Each end of the fuse is made water tight.

"This powder will be left to snow and drift under during the winter, and at the proper time next spring a blasting cap will be inserted in the pole end of the Cordeau and the entire charge detonated at once."

Bureau of Roads Report

Summary of activities during the past year—Federal Aid construction of roads, bridges and grade crossing elimination; forest highways; distribution of surplus war materials; highway research; transportation surveys; publicity.

The annual report for the year ending June 30th, 1924, of the Bureau of Public Roads, which has just been made public, reviewing the activities of the Bureau for that year, shows that its investigations are beginning to bear fruit in more or less final determinations and conclusions. Of course, it is realized that none of the conclusions are final in all their details, since this can hardly be said of any decisions concerning the application of involved physical laws to engineering materials and structures. The report also sums up the work done on federal aid roads during the latest fiscal year and up to the end thereof.

FEDERAL-AID ROADS

The most important step taken is that given as "the final designation and approval of the Federal-aid highway system in all the states of the Union." The system as so selected can be carried out in a period of not more than ten years and "will result in a connected system of arterial highways that will permit unobstructed highway transportation between all cities of 5,000 population or larger."

The total mileage of existing roads as certified by the states amounted to 2,866,061 miles. The law provides that 7% of this may be included in the Federal-aid highway system. This 7% amounts to 200,624 miles, and up to the end of the latest fiscal year 171,687 miles had been accepted by the Bureau. A considerable part of this is already improved and this reduces the magnitude of the task. In three states, Delaware, Maryland and Rhode Island, the original system has already been completed or provided for and additions to the system in excess of 7% have been approved by the secretary. Anticipating the completion of the system in other states, most of which have a much larger mileage than the three just named, a detailed examination of

FEDERAL-AID ROADS

Mileage of Federal-aid roads completed during the fiscal year 1924, by types of construction and by States

States	Graded and drained	Sand-clay	Gravel	Water-bound macadam	Bituminous macadam	Bituminous concrete	Portland cement concrete	Brick	Bridges	Total
Alabama	.....	78.1	149.8	.....	17.4	31.2	4.8	.....	0.2	281.6
Arizona	16.0	37.8	85.2	.....	.....	4.0	17.8	.....	0.4	161.1
Arkansas	.....	.....	81.1	4.5	8.3	10.6	15.9	.....	0.3	120.7
California	71.0	.....	86.6	7.3	14.8	5.1	51.4	.....	.....	236.1
Colorado	12.5	.....	63.5	.....	.....	1.0	42.4	.....	0.5	119.9
Connecticut	.....	.....	.....	.....	.....	.....	17.3	.....	.....	17.3
Delaware	.....	.....	.....	.....	.....	.....	26.6	.....	.....	26.6
Florida	.....	.....	.....	.....	20.6	8.6	21.1	3.8	0.1	54.1
Georgia	.....	152.7	100.3	4.5	20.8	9.1	25.5	.....	0.6	313.4
Idaho	2.3	.....	78.9	.....	.....	6.8	12.8	.....	0.1	100.7
Illinois	0.2	.....	.....	.....	.....	.....	108.2	.....	0.9	109.4
Indiana	0.5	.....	12.4	.....	.....	.....	70.4	.....	0.3	83.6
Iowa	260.0	.....	108.2	.....	.....	.....	121.1	.....	.....	498.3
Kansas	37.5	16.8	20.1	.....	8.7	.....	95.7	18.1	.....	197.0
Kentucky	80.0	.....	2.9	.....	41.1	.....	16.8	.....	0.1	149.8
Louisiana	.....	.....	49.3	.....	.....	1.9	.....	.....	.....	51.2
Maine	.....	.....	48.0	.....	12.1	.....	16.8	.....	.....	77.0
Maryland	1.0	.....	5.0	.....	.....	6.5	48.2	.....	.....	60.6
Massachusetts	.....	.....	.....	.....	42.1	.....	22.2	.....	0.3	64.5
Michigan	.....	.....	40.7	8.9	.....	9.3	92.5	.....	.....	151.5
Minnesota	81.2	.....	291.2	.....	.....	.....	6.9	.....	0.2	379.6
Mississippi	.....	14.4	93.5	11.1	.....	3.4	19.0	2.8	.....	144.3
Missouri	104.5	.....	236 6	[1]28.7	18.0	.....	25.6	.....	0.8	357.0
Montana	25.6	.....	33.5	.....	.....	.....	4.8	.....	0.1	63.9
Nebraska	144.2	100.9	57.1	.....	.....	0.7	24.4	4.4	.....	337.8
Nevada	13.5	.....	24.7	[1]3.5	15.6	.....	1.2	.....	0.1	51.7
New Hampshire	.....	.....	8.3	5.2	14.5	3.7	1.9	.....	0.8	34.5
New Jersey	.....	.....	.....	.....	.....	.....	37.8	.....	.....	37.8
New Mexico	42.6	.....	129.0	.....	.....	0.7	6.8	.....	.....	179.0
New York	.....	.....	.....	.....	119.2	.....	169.6	0.7	1.4	291.0
North Carolina	3.1	4.5	.....	14.3	[1]5.0	24.4	68.8	.....	0.1	110.2
North Dakota	497.9	1.5	107.8	.....	.....	[1]0.4	1.1	.....	0.3	608.2
Ohio	13.5	.....	.....	5.6	33.7	26.6	69.0	119.4	.....	267.7
Oklahoma	0.9	0.3	82.6	6.3	.....	18.2	15.0	.....	0.7	123.8
Oregon	.....	.....	110.7	.....	.....	12.3	9.0	.....	0.4	132.4
Pennsylvania	.....	.....	.....	.....	0.3	14.5	158.1	1.1	.....	174.0
Rhode Island	.....	.....	.....	.....	1.8	3.9	4.8	.....	.....	10.5
South Carolina	.....	292.6	21.5	.....	.....	2.8	3.7	.....	[1]0.2	320.6
South Dakota	42.2	.....	374.2	.....	.....	.....	0.8	.....	0.2	417.4
Tennessee	3.3	.....	.....	19.3	62.5	.....	.....	.....	.....	85.2
Texas	32.2	.....	429.9	34.5	61.6	40.9	21.9	19.2	0.7	641.2
Utah	39.1	.....	89.3	.....	.....	.....	11.0	.....	0.5	139.9
Vermont	.....	.....	15.6	.....	5.4	.....	.....	.....	0.2	21.3
Virginia	12.0	48.6	.....	17.1	28.6	.....	57.2	.....	0 3	163.9
Washington	1.6	.....	42.9	.....	.....	.....	4.6	.....	.4	49.4
West Virginia	10.2	.....	7.1	.....	24.3	.....	10.2	.....	.....	52.0
Wisconsin	24.2	18.9	175.4	.....	.....	.....	47.4	.....	.....	265.8
Wyoming	14.3	121.0	30.9	.....	.....	.....	.....	.....	.2	165.9
Total	1,604.8	888.2	3,353.8	106.7	566.6	252.1	1,667.9	169	10.8	8,620.3

[1]Negative figures caused by revision of records when final vouchers were paid on projects the type of which was changed after ratification of project agreement.

all roads in the systems of these states is now under way, those of Connecticut and Pennsylvania being completed and New Jersey nearly so.

That part of the system located in the eleven Pacific and mountain states is now more than 50% completed. In this section attention has been given especially to the acceleration of the improvement of through roads to the Coast, although the national need for these roads does not in all cases coincide with the local highway needs. Except in the sparsely settled western States, however, national and local needs are practically identical.

Last year 8,620 miles of completed roads were added to the system, bringing the total of Federal-aid roads to 35,157 miles. The total cost of the Federal-aid roads completed last year was $144,707,337, of which $66,789,427 was paid by the Federal Government.

As in previous years, the mileage of gravel roads completed exceeded the mileage of any other type of construction, as is shown by the accompanying table. The mileage of Federal-aid roads completed up to June 30th, 1924, is as follows: Graded and drained, 7,015; sand-clay, 3,727; gravel, 13,811; waterbound macadam, 903; bituminous macadam, 1,652; bituminous concrete, 1,029; Portland cement concrete, 6,428; brick, 537; bridges, 53.8—a total of 35,157.

Experience has demonstrated the wisdom of the policy of approving low type surfacing materials with a view to improving the character of the surface as the traffic may demand in the future. This is especially true of gravel. It is found that "the tractive resistance of well maintained gravel surfaces is only slightly greater than that of the highest types of paved roads. The cost of vehicular operation over such roads is therefore not greatly in excess of the minimum attainable by paving. The original cost is much lower, and so long as the traffic does not exceed in volume or weight the limits within which these lower types are economically maintainable, the experiments indicate that the investment in them is a good one. Other experiments show that the low-type surfaces make the best possible bases for pavements when the traffic reaches proportions which justify paving."

Federal aid has been used to great advantage in the bridging of major streams on main roads. In many cases where these streams form the boundaries between states or other political divisions, Federal aid and the co-ordinating influences of the Federal government have been the means of securing practical action where agreement to such action had not formerly seemed possible.

Grade crossing elimination has been greatly aided by Federal aid and advice and 26% of the grade crossings existing in Federal aid projects have been eliminated. Sixty-five per cent of the elimination was due to relocation of the roads and the remainder to overhead structures or underpasses. Many of the 74% not eliminated are across branch line railroads or industrial roads carrying few trains, and the 26% elimination, therefore, represents that of a much larger percentage of the hazard.

Forest highways have been selected for Federal aid in Alaska and all except three of the western states in which there are national forests—California, Oregon and New Mexico—and negotiations are still under way with these states. The forest highway system will probably approximate 775 miles of Class 1 roads, between 6,000 and 7,000 miles of Class 2 roads, and between 4,000 and 5,000 miles of Class 3 roads. Up to the close of the fiscal year, 1,823 miles of these roads had been completed at a cost of $18,228,305.

Traffic on many of these roads has reached the point where it is necessary to widen some and to surface others; although the natural soil in many cases is of such nature that it will carry the traffic without additional surfacing.

It is the aim of the Bureau where possible to keep the standard of the forest highways equal to that of the adjacent state and Federal-aid highways. Due to sliding banks and other happenings, the most critical time for the maintenance of these roads is the first two years after construction, and the Bureau maintains all forest highways during this time, after which the local cooperator assumes the responsibility and expense.

SURPLUS WAR MATERIALS

During the fiscal year the Bureau distributed war materials to the value of $12,271,533. The largest item in value was that of explosives worth $3,412,820, or 28% of the total value of the war material distributed, an increase from slightly less than 3% of the value distributed prior to last year. A considerable part of this, however, was for farmers rather than highway work.

The next largest item was 860 motor vehicles valued at $1,693,847 and 125 tractors valued at $530,209. Spare parts for automobiles and tractors were valued at $2,222,924. Up to last year the item of motor vehicles constituted over 40% in value of the total distribution but last year dropped to 14%. Shop machinery was furnished to the value of $1,007,186 and road machinery valued at $86,049.

To date the value of the surplus war material distributed has been $241,067,371. It is estimated that if this material had been sold, it would have brought somewhere between twenty and thirty million dollars, and this disposition of it has, therefore, saved the general taxpayers over $210,000,000.

HIGHWAY RESEARCH

The Bureau regards highway research as no less important than construction work and, in fact, as necessary to insure the successful administration of the construction work. Most of the results of such research up to date have been made public and given to the readers of PUBLIC WORKS, in conformity with the most commendable policy of the Bureau to publish results as promptly as practicable.

"Facts are now being brought to light which, considered in relation to each other, indicate the general outlines of a scientific method which will practically eliminate guesswork, waste and uneconomical practises. . . Methods have been devised by which it can be determined with scientific accuracy whether or not the improvement of a road is desirable and the form which the proposed improvement should take. The studies of subgrade soils are showing what practical steps may be taken to secure a satis-

factory foundation for the roads and what provision must be made in the design of the surface to overcome the handicap of unstable subgrades. It is now possible to design with practical certainty types of road surface which will satisfactorily serve traffic of several classes of density and weight and to adapt the type of surface to the traffic with considerable precision. Methods of maintenance are gradually crystallizing which insure the conservation of the investments made; and principles of finance have been evolved, based upon the economic and physical investigations, which seem to assure wise expenditure of the public money and a fair distribution of the expenses to the several classes benefited."

Among the physical researches and tests are those concerning impact on concrete road slabs, stress measurements on such slabs, measurement of impact by motor vehicles and the proper design of skew arches. Impact tests had been made a few years ago, but a new series is under way employing a new method using an accelerometer, which is found both simple and reliable. It is believed that the experiments on skew arches will lead to a change in the present method of skew arch design.

A series of tests of paving brick was made in cooperation with the American Society for Testing Materials with the idea of determining the effect of variation in the size of the brick upon the rattler loss. Other tests made include compression tests for Portland cement, the relation between quality of cement and quality of concrete in which it is used, the relation between quality of sand and the crushing strength of concrete in which it is used, the quality or rock desirable for concrete aggregate, the developing of a universal standard screen scale for testing sieves, determination of the effect of moisture in causing the bulking of sands, etc.

Investigations have been made with a view to evolving tests of bituminous paving mixtures, particularly in regard to their behavior under traffic. Plans have been completed for a new series of tests comprising twenty-eight sections of sand mixtures in which the grading of sand, percentage of filler dust, and percentage, consistency and character of asphalt are varied, together with five sections of stone and sand mixtures. The essential purpose of this test is to furnish a means of correlating service behavior with laboratory tests of mixtures.

In cooperation with the technical committees on road materials of the Federal Specifications Board, new specifications for oil, asphalt, and tar products have been compiled. Co-operative experimental tests have been carried on with various state highway testing laboratories in connection with the work of the sub-committee on bituminous and chemical testing problems of the American Association of State Highway Officials.

One of the most important lines of investigation which has been developed recently is that dealing with subgrade materials, in conformity with the increasing realization that the character of the subgrade upon which a road is constructed plays a most important part in its durability and the amount of load it will carry. The investigation points directly to possible ways in which plastic, volume-changing subgrade materials may be improved by the use of admixtures of more stable granular materials. Field studies have been made in Iowa and Minnesota during the Spring thaw, and practical field tests have been made on the value of processes suggested.

A very important feature in research work is the cooperative work carried on by a number of agencies, including Purdue University, the Universities of Texas, Maryland and Kansas, Iowa State College, Kansas State Agricultural College, Iowa State University and the Pennsylvania Highway Department.

During the fiscal year the Bureau made laboratory examination of 1,769 samples of various road materials, most of them for use in connection with federal aid projects.

HIGHWAY TRANSPORTATION SURVEYS

Highway transportation surveys have been undertaken in Connecticut, California, Pennsylvania, Maine and Cook County, Ill. The California report has been published and reports of the other surveys will be issued by January, 1925. The principal purposes of the data obtained in the several traffic surveys are as follows:

(1) HIGHWAY ADMINISTRATION AND ENGINEERING DATA.

(*a*) To determine daily, seasonal, and yearly traffic flow and distribution on State highway systems.

(*b*) To estimate future traffic on State highway systems.

(*c*) To determine the relation of traffic density to the factors responsible for the growth of traffic, such as motor-vehicle registration, production, and population.

(*d*) To classify highways as industrial, high, medium, or low-type traffic routes based on (1) passenger-car and motor-truck density and (2) motor-truck capacities, gross loads, and wheel loads.

(*e*) To determine the density of motor-truck traffic and the gross tonnage per mile of highway.

(*f*) To determine the maximum loading and frequency of *critical* loads on the highways as an index of pavement width and design requirements, and to establish highway traffic width and design factors for highways contiguous to large centers of population.

(*g*) To determine the relation between highway width, traffic density, and speed.

(*h*) To measure the effect of congestion at intersections and "bottle necks" upon the rate of traffic flow.

(*i*) To estimate the extent to which the improvement of old or the opening of new traffic routes is economically justified.

(*j*) To correlate traffic loads and density of traffic on the highways with highway construction and maintenance costs.

(*k*) To determine the type and volume of traffic on the highway as an index to the allocation of highway construction and maintenance funds.

(*l*) To determine the distribution of motor-truck loads and the amount and frequency of motor-truck overloading.

(*m*) To compare the cost of various types of highway improvements such as relocations, grade reductions, eliminations of grade crossings (both rail and highway), and elimination of traffic "bottle necks" with the estimated saving in transportation costs resulting from such improvements.

(*n*) To compare the earning value of the State highway system (based on passenger-miles and freight ton-miles) with the present worth of the highway system using replacement value minus depreciation as the basis of computing present worth.

(2) HIGHWAY ECONOMIC DATA

(*a*) To obtain highway transportation information concerning the volume of tonnage shipped by motor truck, marketing methods, and the relation of highway transportation to other types of transportation.

(*b*) To determine the mileage zones of motor-truck haulage and the relation of the type of commodity hauled to such zones.

(*c*) To estimate the net tonnage of freight transported by regular and irregular trucking operators.

(*d*) To determine the situs of ownership of passenger cars and motor trucks operating over the highway systems.
(*e*) To estimate the value of motor-truck net tonnage hauled over the highway systems.
(*f*) To determine the type of origin and destination as well as the origin and destination of net tonnage of commodities transported by motor truck over the highway systems.
(*g*) To obtain information concerning the relation of motor-truck transportation to other methods of transportation, particularly as to competition, rates, operating schedules, and delivery time in the short, middle-distance, and long-haul mileage zones.
(*h*) To obtain data concerning haulage practices of motor-truck operators, the volume of tonnage transported by motor truck between various cities and areas, and additional data of value to governmental agencies charged with the regulation and control of highway transportation.
(*i*) To estimate passenger-car business and nonbusiness usage of highways.
(*j*) To determine the proportion of farm traffic on the highways.

A survey of highway-truck transportation and marketing in the Chicago Metropolitan area has developed several important facts. One of the most striking is the almost complete absence of cost records maintained by motor truck companies. The field work of a study of the influence of highway improvement on rural land values in sixteen counties in Iowa has been completed, the conclusions from which, supported by other investigations, will determine the limits of increase in rural land values resulting from the several types of highway improvements and assist in determining the amount which rural land can economically contribute to highway improvements on the basis of increased values per acre resulting from the highway improvement.

PUBLICITY

The Bureau, through its monthly publication, "Public Roads," keeps the public informed promptly concerning all work in hand and preliminary and tentative conclusions therefrom. Another medium of information and publicity is that of motion pictures. During the past year such pictures have been made of the highway experiments at the Arlington Experiment Farm, tests of guardrails by the Pennsylvania State Highway Department, and a two-reel picture of the highway inspection tour of the Pan-American Commission in June of this year. The Bureau also cooperates with the office of Exhibits in the preparation of models and exhibit booths for exhibition at state fairs and in the demonstration of department exhibits at such fairs and has also prepared special displays for automobile shows and highway conventions.

Wayne County's Highway Plans

Purchasing wider rights-of-way and plans for "Super-highways."

In a recent address, Edward N. Hines, chairman of the Board of County Road Commissioners of Wayne County, Michigan, told of some of the ideas which the county hoped to carry out in the near future, chief among these being increasing the width of the highways.

Several years ago the county began increasing the minimum width of pavement to 20 feet and the overall width to 30 feet; also the capacity of the bridges was increased to a 30-ton live load and the clear roadway width to a minimum of 27 feet. The bridges were constructed largely of a T-beam and slab type with a pre-cast concrete handrail, which type of bridge lends itself to future widening without any great loss of investment.

One hundred-foot rights-of-way have been acquired on some of the radial roads leading out of Detroit and many concrete highways have been constructed ranging from 40 feet in a single roadway to 70 feet between curbs with provision for interurban tracks in the center.

The very widening of the roads, however, has attracted additional traffic and demands additional accommodation for vehicles. As a result, all the territory in Wayne, Oakland and Macomb Counties that lies within a 15-mile radius from the Detroit city hall is now being mapped with respect to the widths of rights-of-way of all mile, half-mile, radial and other important roads. Every half-mile road is being planned for a minimum 86-foot width; every mile road a full 120 feet, except that every third mile road is having 84 feet added for future rapid transit needs making a total of 204 feet for these super-highways. Radial main arteries, which are of greater importance than meridian roads, since they have no parallel highways, are being planned for a right-of-way of 204 feet.

This width of 204 feet was arrived at by taking 120 feet for an arterial city street and adding 84 feet to it for surface rapid transit. A 120-foot street with a 4-track rapid transit subway beneath it being taken as a standard, it is assumed that at the edge of the built-up area of the city the four tracks are brought out from underground and laid upon the surface. Grade separations are to be provided every half mile, and the 120-foot street be divided into two 60-foot sections placed one on each side of the surface rapid transit lines. With these half-mile grade separations the express motor vehicle roadway can be carried over the intersecting streets and provide a new facility not now available to the motor vehicle owner anywhere in the world.

This roadway, which Chairman Hines calls the "super-highway," will have a width permitting the planting of trees and shrubbery in places along its route where they will not be disturbed by successive steps in its development.

During the fiscal year just closed, Wayne County expended over $800,000 in acquiring additional rights-of-way and expects to expend upwards of a million dollars for the same purpose in 1925. It has established as a policy an ultimate minimum width of 40 feet of concrete on all of the main highways in Wayne County and all roads are now being graded to a width of 40 feet so that when it becomes necessary to widen them there will be already available a firm subgrade on which to work. Two crews are kept busy continuously during the working season widening all concrete roads that are less than 18 feet wide.

NEWS OF THE SOCIETIES

CALENDAR

Jan. 18-19—AMERICAN ROAD-BUILDERS' ASSOCIATION. The annual convention and National Good Roads Show, Chicago, Ill.

Jan. 16-18—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual meeting at New York City.

Jan. 17—ASSOCIATED GENERAL CONTRACTORS AND AMERICAN ROAD BUILDERS' ASSOCIATION. Joint meeting in Chicago.

Jan. 21-24—ASSOCIATED GENERAL CONTRACTORS OF AMERICA. Annual meeting, Chicago, Ill.

Jan. 22-23—NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION. Annual meeting, Cincinnati, O. Secretary, Edward E. Duff, Jr., Cleveland, O.

Feb. 13-15—NEW JERSEY STATE HIGHWAY ASSOCIATION. Fourth annual state highway convention, Stacy-Trent Hotel, Trenton, N. J., Chairman of arrangements committee, A. Lee Grover.

May 19-23—AMERICAN WATER ASSOCIATION. Annual convention at Hotel Astor, New York City. Secretary, J. M. Diven, 153 West 71 St., New York.

June 23-28—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting at Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

Feb. 25-28—AMERICAN CONCRETE INSTITUTE. Annual convention, Chicago. Secretary, Harvey Whipple, 1807 East Grand Boulevard, Detroit.

ENGINEERS' CLUB OF PHILADELPHIA

Secretary Charles E. Billin announces a conference to be held morning, afternoon and evening of January 15th for the discussion of "Economy in the Use of Fuel." The commercial phase of competitive fuel saving devices is to be avoided and only the engineering and financial phases discussed. Papers will be presented by engineers recognized as authorities on the subject, with time limits of fifteen minutes on papers and five minutes on open discussion. The subject is divided into the following phases: Railroads—electrification and other possibilities. Public utilities and manufacturing uses (heat and power)—centralization, boiler plant economies, process steam and heat, and types of fuel. Metallurgical uses—iron, steel and other metallurgy, reheating furnaces, cement, coal carbonization including gas and by-products and the increasing use of gas in industry. Domestic—economy in types of fuel, anthracite and burning of small sizes, and gas for house heating.

ASSOCIATED GENERAL CONTRACTORS

The Associated General Contractors of America, which is to hold its Fifth Annual Meeting in Chicago January 21st to 24th, announces that the keynote at the convention will be "cut construction costs." Special efforts will be recommended to capitalize to their fullest weather conditions favorable to construction operations, increase the amount of winter-building, and store building materials during periods of the year when construction is at its lowest ebb. This will reduce the contractor's overhead and enable him to avoid the extra expense entailed by the present "sprint and spurt" character of construction work, as well as enabling him to better hold together his skilled organization.

The annual banquet will be held on the evening of January 24th. There will be an extensive entertainment program, the General Contractors Association of Chicago being host to the visiting contractors and their ladies.

AMERICAN ROAD SHOW AT CHICAGO

Demand for space at the Road Show, given in connection with the American Road Builders Convention in Chicago this month, has been so great that it is found necessary to provide additional space and the Wilson Building has been obtained for this purpose. The entire space available in the Coliseum, the Coliseum Annex and the Grear Building were spoken for early in December. The Wilson Building will furnish about 4,600 square feet of floor area. It was obtained through an arrangement with the Austin Machinery Corporation, which will occupy a part of the building.

CORNELL CONFERENCE ON HIGHWAY ENGINEERING

A conference on Highway Engineering was held at Cornell University on December 18, 19 and 20 by the New York State Bureau of Highways under the auspices of the School of Civil Engineering of the University. Among the papers on the program were "Subgrade Investigations," "Economics of Relocation of Highways," "Use of the Vialog to Determine Pavement Imperfections," "Structural Design of Pavements," "Traffic Regulation," "Bituminous Pavement Construction," "Maintenance of Pavements," "Concrete Road Inspection and Construction Methods," "Essentials of Highway Construction," "Proper Relation Between Engineers and Contractors," and "Snow Removal."

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS

The ninth annual meeting of this association was held in New Orleans, December 3 to 6. The annual meeting of the Western Association of State Highway Officials was held in conjunction with it.

The question of renewal of Federal aid appropriations was the most important subject considered. The representatives of the various states in attendance believed these appropriations should be continued equal to or greater than those of the past two years. On this subject the following resolution was adopted:

Whereas, the Federal aid road law and Federal highway appropriations have contributed more to the development of the highway system of the United States than all previous efforts combined in that

1.—A definite nation wide co-ordinated highway system has been established.

2.—Highway construction by the Federal Government, States and other political subdivisions has been stimulated to a degree far in excess of the actual Federal funds appropriated.

3.—State highway departments having a trained personnel and centralized authority have been established in all States, and

4.—Higher administrative and engineering standards have been developed, and

Whereas, the appropriations thus far made have been wisely expended by the Bureau of Public Roads in cooperation with the States, and

Whereas, the three year program of appropriations and construction as now established by law terminates on June 30, 1925, and

Whereas, this continuity of policy and construction can only be insured by the Congress of the United States now in session taking suitable action during the present session; therefore, be it

Resolved, by the American Association of State Highway Officials in regular session at its ninth annual convention in New Orleans, Louisiana, this fifth day of December, 1923, that said association does hereby respectively urge that the Congress of the United States at the present session, pass suitable legislation providing for a three year Federal aid program beginning July 1, 1925, and similar in policy to the program now in force, and be it further

Resolved, that this Association does hereby strongly recommend that the amount of said Federal aid program be as follows:

for the period July 1, 1925 to June 30, 1926, $100,000,000; for the period July 1, 1926 to June 30, 1927, $100,000,000; for the period July 1, 1927 to June 30, 1928, $100,000,000

it being understood that the actual appropriations of funds need not be made until needed to meet construction costs, and be it further

Resolved, that the Executive Committee of this Association is hereby directed to confer with the President of the United States, the Secretary of Agriculture and the Members of Congress and urge upon them the adoption of this program.

These resolutions have been laid before the leaders of Congress and the Secretary of Agriculture. A "western bloc" has been organized in Congress to further highway legislation as it affects the western states.

Other resolutions were adopted with reference to the distribution of surplus war material; Federal aid appropriations for the territory of Hawaii and other subjects. Of special importance to the western states was the proposal of the chief of the Bureau that the limitation of cost per mile to $30,000 for Federal aid construction be removed and such aid be given to highways of the higher types of construc-

tion; and the proposal that Federal aid be given to the public land states on the basis of 100 per cent aid for construction, the state to pay for administration, surveys and plans, and maintenance as at present.

In addition to these resolutions and discussions, a number of papers were read and discussed. H. G. Shirley and H. K. Bishop called attention to the turnover in department administration. During the eight years of federal aid 48 states have had 117 chief engineers of highway departments, of which 34 served one year, 35 two years and 13 three years. Ten states have retained the same man throughout the eight years.

Thomas H. MacDonald presented figures concerning road construction and needs. Among the latter were grade crossing elimination, stabilizing subgrade soils, more department testing laboratories, better inspection of construction, and uniform traffic regulations.

Charles M. Upham described the development of the sand-asphalt and near-macadam roads of North Carolina, as a wearing surface for sand-clay roads, which will carry almost any load without breaking down but wear rapidly by abrasion when the traffic exceeds about 400 vehicles a day. The old road is scarified, a layer of 3½ in. stone is spread and rolled and covered with asphalt, about 1.6 gallons per square yard. This in turn is covered with a layer of smaller stone and rolled, given a light dressing of asphalt and small stone and again rolled. These roads cost half as much as bituminous macadam and stand up under heavy traffic.

Clifford Older described the continuation of the Bates road tests, using concrete with edges thickened to 9 inches. G. W. Hutchinson of North Carolina described tests of materials for concrete roads, which were discussed by A. T. Goldbeck.

J. N. Mackall of Maryland described recent tendencies in financing construction. He regarded as alarming the recent tendency to use automobile license fees and gasoline taxes to finance relatively long-term bonds for construction. He believed it desirable to use these for maintenance, but not to give construction bonds the first call on them. All maintenance and reconstruction should be cared for from current receipts, and only the balance from these should be used for carrying capital charges. A community that cannot raise money to construct roads with reasonably short-term bonds probably cannot in ten or fifteen years raise money for reconstruction which may then be necessary.

John H. Mullen, chief engineer of the Minnesota Highway Department, described midwestern practice in constructing gravel roads, this consisting briefly of spreading gravel on the road-bed and compacting it under traffic and maintenance. If the subgrade is a bad sand, a sand-clay crust is first built; if of mucky material, a covering of clay is applied. The subgrade is bladed, the gravel is dumped in a ridge and spread with blade graders leaving not to exceed 3 inches thickness on a width of 20 feet. Traffic is then turned onto the road and a small amount of gravel is bladed in from the side ridges from time to time until a crust is formed by the traffic. The only requirement of the specifications that is uniform in all sections is that gravel particles shall not exceed 1 inch in diameter, to secure which the gravel is ordinarily screened in a rotary or shaker screen fed by a conveyor. The state buys or leases gravel pits on an acreage basis or at so much per cubic yard.

J. M. Fourmy, state highway engineer of Louisiana, stated that 25% of the land in that state is undrained and building roads over such land was quite a problem. Generally the topsoil was removed and an embankment was built of the clay subsoil obtained by dredging a borrow canal parallel to the road.

The constitution was revised and now permits of three classes of members: active, associate and honorary. Only the first can vote, being confined to chief directing officials of state road departments. Subordinate officials are classed as associate members, while honorary membership is provided for former state and territorial officials and professors of highway engineering in universities, and others proposed by members and elected by the executive committee.

The officers elected for the present year are: President, F. R. White, chief engineer of the Iowa Highway Commission; vice-president, F. F. Rogers, state highway commissioner of Michigan; secretary, C. M. Upham, state highway engineer of North Carolina; and treasurer, F. T. Sheets, superintendent of highways of Illinois.

NORTHEASTERN SECTION, A. S. C. E.

The annual meeting of the Northeastern Section, American Society of Civil Engineers will be held in Boston, January 26. The nominees presented by the nominating committee to be voted on at the meeting are: For president, P. D. G. Hamilton; vice-president, Charles H. Pierce; secretary-treasurer, Charles W. Banks; members of executive committee, Clinton D. Thurber and Edward H. Cameron.

The speaker will be Edward Dana, general manager of the Boston Elevated Railway Co. The luncheon will be at 1:15 at the Boston City Club.

CITY MANAGERS' ASSOCIATION

The tenth annual convention was held in Washington, D. C., Nov. 13 to 15. A part of the three days was spent in inspection trips to parks, schools, reformatories, etc., and in joint session with the National Municipal League and the Government Research Council. The papers and discussions before the association were divided into three sections, dealing respectively with communities of 15,000 or more, 10,000 and 5,000 population. Refuse disposal, water supply, zoning, street lighting, shade trees and markets were among the subjects considered.

LEAGUE OF CALIFORNIA MUNICIPALITIES

The next convention will be held on October 6 at the Hotel Del Monte, Monterey. Between now and then a series of regional conferences will be held throughout the state by municipal officials to develop a definite municipal program as a basis for the activities of the league.

NORTH CAROLINA SECTION, A. W. W. A.

At the annual convention of the North Carolina Section of the American Waterworks Association the following officers were elected for this year: President, J. W. Michie, superintendent of waterworks of Durham; vice-president, William M. Piatt, of Durham; and secretary-treasurer, Thorndike Saville, of Chapel Hill.

IOWA ENGINEERING SOCIETY

The annual meeting of the Iowa Engineering Society will be held at the Montrose Hotel in Cedar Rapids January 29th to February 1st. January 29th there will be a technical program by the Drainage Section in the afternoon. Wednesday morning there will be the opening addresses, president's address, etc. Wednesday afternoon, technical programs in drainage, highway, mechanical, electrical, municipal, railroad, and structural-architectural sections. Wednesday evening the annual campfire with special entertainment, impromptu speeches, etc. Thursday morning and afternoon and Friday morning there will be a general program and on Thursday evening the annual banquet and dance.

NEW ENGLAND WATERWORKS ASSOCIATION

The December meeting of this association was held at the City Club, Boston, on December 11th with about one hundred members present. J. R. McWane, president of the McWane Cast-Iron Pipe Company, read a paper entitled "The Use of Small Cast-Iron Pipe for Services," and J. H. Howland, engineer of the National Board of Fire Underwriters, read one

entitled "Standardization of Fire Hose Threads." Both these papers were discussed by several of the members, President Heffernan reading Massachusetts' House Bill No. 29, which had just been introduced and which provided that all fire hose connections and hydrant connections be of the standard size and thread and that all valve stems on hydrants be uniform in operation and size and the hydrant wrenches be uniform; the standards to be established by the department of public safety.

AMERICAN WATER WORKS ASSOCIATION

Although the association had voted to hold the next convention at Memphis, the officers found (as did those of the American Society for Municipal Improvements last year) that proper accommodations could not be obtained, and the Joint Convention Committee of this association and the Manufacturers' Association has selected New York City instead, with the Hotel Astor as headquarters, which agrees to reserve 500 rooms for the convention, May 19 to 23.

The nominating committee submits the following names for the year 1924-1925: For president, Frank C. Jordan, of Indianapolis; for vice-president, Harry F. Huy, of Buffalo; for treasurer, William W. Bush, of New York; for trustees, Edgar H. Hoopes, Jr., of Wilmington, Del., and J. Arthur Jensen of Minneapolis.

NEW JERSEY STATE HIGHWAY CONVENTION

The Fourth Annual New Jersey State Highway Convention will be held at the Stacy-Trent Hotel, Trenton, on February 13 to 15, under the auspices of the New Jersey State Highway Association. There will be papers and discussions each day and an exhibit of materials and equipment. G. Roland Moore is president; A. Lee Grover is chairman of the arrangements committee.

PERSONALS

Leisen, Col. Theodore A., recently in charge of the waterworks system of Detroit, Michigan, has been made general manager of the Metropolitan Utilities District of Omaha. As such, his chief duties will be in connection with the city's water supply.

Rieman, J. D., recently county engineer of Red River County, Texas, has been appointed county engineer of Hopkins County, same state.

Lindley, A. C., recently engineer of construction work of the Missouri State Highway Department, has joined Louis Rich of Kansas City, Missouri, in the road contracting business.

Albrich, E. R., recently construction engineer with the North Carolina Department, has been appointed assistant director of the Advisory Highway Research Board of the National Research Council.

Parker, A. E., of Larned, Kansas, has succeeded C. C. Rhems as city manager of Pratt, Kansas.

Osborn, Henry Z., Jr., formerly engineer of street planning for Los Angeles and chief engineer of the Board of Public Utilities of that city, has opened an office as consulting engineer in the Pacific Finance Building of the same city.

Brownlow, Louis, formerly city manager of Petersboro, Virginia, on December 15th became city manager of Knoxville, Tennessee.

Cottrell, C. C., formerly manager of the Good Roads Bureau of the California State Automobile Association and also superintendent of highway construction and maintenance for the State of California and state engineer of Nevada from 1918 to 1920, has become chief engineer of the Western Willite Company with headquarters in Los Angeles.

Lammiman, F. A., has been appointed city engineer of Chico, Cal.

Steele, George E., a prominent civil engineer in Wisconsin for many years, died in Grass Valley, Cal., December 6, age 81 years.

Kearby, J. P., has been appointed division engineer with the Texas State Highway Department.

Price, C. F., city manager of San Mateo, Cal., has been appointed city engineer and superintendent of streets.

Hezmalhalch, C. C., has been appointed deputy state engineer of Colorado.

McNutt, George, formerly construction engineer with the North Carolina State Highway Commission, is now superintendent of highway construction in that state for the Public Service Corporation of Newark, N. J.

Driven, J. M., secretary of the American Water Works Association, is again superintendent of water works at Troy, N. Y., which position he resigned in August, 1919.

McKibben, Prof. Frank P., head of the civil engineering department of Union College, began on Jan. 1 service as city engineer of Schenectady, N. Y. He continues in charge of the department.

Brinkerhoff, Harry A., has been appointed city manager of Portland, Me.

Ransom, Thomas W., formerly assistant city engineer of San Francisco, died Dec. 19.

Reimer, Wm. H. V., formerly city engineer of East Orange, N. J., died following an automobile accident on Dec. 2. He was 75 years old.

INDUSTRIAL NOTES

P. & H. SHOVEL AS A WADER

The versatility of the P. & H. shovel was illustrated recently at Eau Claire, Wisconsin, where the Dello Paper & Pulp Company is building a new dam. The company had purchased a ¾-yard gasoline Pawling & Harnischfeger shovel, but as there was a bluff on each side of the river at the dam site, they were in a quandary as to how to get the machine down to the river bed where it was to be used in excavating. The P. & H. Company, however, sent one of its engineers, and he found that the machine could run into the river ¼ mile below the dam and travel up the bed of the river to the location of the work. The river bed was rocky and full of deep holes and ledges, and the machine at times almost stood on end, but in 4½ hours it reached the cofferdam and in another hour had crawled up over it and down on the other side over planking and supports that were laid on the dam to carry it. The company is now moving the shovel from site to site in the riverbed by running it through the water as freely as though it were on land.

COMPRESSED AIR STANDARDS

A pamphlet entitled "Trade Standards" has been adopted by the Compressed Air Society after extended study and research and "embraces the nomenclature and terminology relating to air compressors and their operation; a history of the development of speeds of air compressors; an explanation of capacities and pressures; instructions for the installation and care of air compressors with illustrations of devices suggested for cleaning the intake air; recommendations for the lubrication of air compressing machines and the cleaning of air receiver piping; a description of the low-pressure nozzle test recommended by the Society, and a partial list of applications of compressed air."

The Compressed Air Society is composed of fourteen manufacturers of appliances such as air compressors, pneumatic drills and other machinery for using compressed air. Among the uses of compressed air listed which are of special interest in our field are noticed pumping water and various features of contract work such as operating drills, hammers, caulking machines, steam shovels, tampers, etc. One use which we do not see mentioned is providing air for activated sludge treatment of sewage. The pamphlet contains several illustrations and tables and practical information useful to those employing compressed air.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

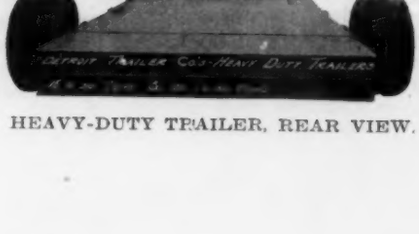
LINK-BELT LOADER

A new crawler-tread portable loader is being introduced by the Link Belt Company of Chicago and will make its first appearance at the Good Roads Show in that city. By means of a swivelling feature it can cut a path 20 feet wide through a pile of material. This loader is called by the manufacturers the "Grizzly," the new feature of which is the crawler tread, which is considered a distinct improvement because of the frequent necessity for moving the load over railroad tracks or rough ground or up inclines. At the same time that the crawler tread was added, the base was made of solid cast steel construction instead of using rivets and bolts; this base being pivoted on the tread in a fashion similar to that employed for locomotive cranes. The crawler is the same as used on the Link-Belt crane. The manufacturers claim a loading capacity of 45 cubic feet per minute when handling bituminous coal or sand and 40 cubic feet with crushed stone not larger than 1½ inch.

GRIZZLY CRAWLER—TREAD PORTABLE LOADER

NEW RIVETING HAMMER

The Ingersoll-Rand Company has begun the manufacture of a new type of riveting hammer, the outstanding features of which include bolted construction for holding the handle to the barrel; heavy-section valve with liberal bearing surfaces; combination poppet and piston type throttle valve; power in excess of all ordinary requirements; low air consumption, and exceptionally easy operation. It is made in three styles and from 5-inch to 9-inch stroke in either style. Style "A" has the barrel machined to accommodate a rivet set clip only, and is furnished unless the bridge type or retainer type barrel is specified. The hammer with 5-inch stroke, without set, weighs 18-1/2 pounds, and that with the 9-inch stroke weighs 24 pounds. Each size has a 3/8-inch pipe tap for hose connection. The 5-inch drives rivets up to 3/4-inch diameter and the 9-inch up to 1-1/4 inches diameter.



HEAVY-DUTY TRAILER, REAR VIEW.

HIGHWAY LIGHTING UNIT

A lighting unit designed especially for the lighting of highways has been prepared for the market by the Westinghouse Electric and Manufacturing Company with a view to meeting the special conditions presented by such service. This unit consists essentially of a porcelain housing which contains a series socket for a type C lamp, a reflector, and a double set of refracting prisms. It is arranged for suspension from either brackets, mast arms, or span wires, as the mounting conditions may require. The reflector is made of steel highly polished and lacquered on the inside, and parabolic in shape so that all the light is thrown in a direction parallel to the roadway. Most of the light is controlled by the upper parabolic reflector which redirects the rays vertically downwards upon the two refracting prisms and thence to the road surface in two directions only.

The manufacturers state that such a unit, if placed at the proper height and spacing, will light the roadway with a fairly uniform intensity and without glare. The last is secured by so positioning the edge of the reflector that the light in a line parallel to the direction of travel is cut off at a direct angle of 14 degrees below the horizontal — the angle which has been determined by exhaustive tests to be the most practical.

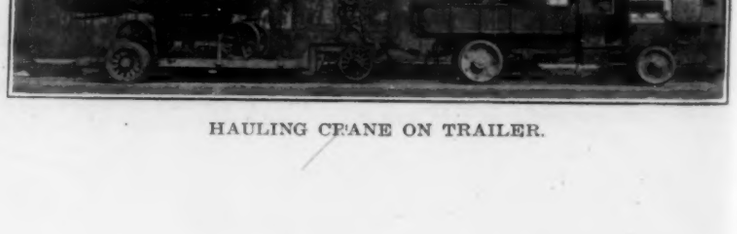
This fixture weighs 75 pounds. If attached to a post by a swivel bracket, which will probably be the most common method of mounting, the bracket furnished for this purpose weighs 25 pounds additional.

HEAVY-DUTY TRAILERS

The Detroit Trailer Company of Detroit, Michigan, manufactures a heavy duty trailer, one size being designed for carrying 15 to 20 tons and another size from 20 to 30 tons. The trailer consists of a heavy platform which can be 14, 16, 18 or 20 feet long and approximately 100 inches wide, carried on four wheels, most of the weight coming on two double-tired wheels, the width between which is 102 inches while the maximum width over all is 136 inches. The illustration shows the trailer used for carrying an Erie crane. One contractor, the J. R. Cook Construction Company of Detroit, uses one of these for hauling a steam shovel and also bringing carload cement to the job, where it is hauled along near the mixer and the cement used from it as required.

DOW CAR CHUTE

A quick unloading car chute is manufactured by the Dow Company of



HAULING CRANE ON TRAILER.

NEW CATALOGUES

(If you want any of these catalogs send the number with your name and address to PUBLIC WORKS and it will be sent to you promptly without charge or obligation.)

AK-WA-FALT

652. The United States Asphalt Refining Company of New York describes a new asphaltic material for cold application for repairing and constructing roads. 8 pages, 6x9.

DIESEL ENGINES

653. The Bush-Sulzer Brothers Diesel Engine Company of St. Louis, Missouri, has issued several pamphlets giving figures concerning the operation of Diesel pumping plants in Madison, S. D., Appleton, Wisconsin, and about fifty other cities, abundantly supplied with diagrams, tables and illustrations. 4 to 12 pages each, 8½x11.

CLIMAX ROAD MACHINERY

654. The Good Roads Machinery Company, Inc., has issued a new catalogue describing Climax crushing and road-building machinery, profusely illustrated. 36 pages, 8½x11.

ION CONCENTRATION MEASUREMENTS

655. The Brown Instrument Company of Philadelphia describes, in Bulletin 100, electrical instruments for measuring hydrogen ion concentration; in Bulletin 105, salinity meters for measuring salinity of boiler waters. Each 4 pages, 7½x10.

VENTURI METERS

656. The Builders Iron Foundry of Providence, R. I., describes briefly the uses of Venturi meters and the apparatus. 4 pages, 8½x11.

PERMUTIT

657. The Permutit Company of New York City has issued a 30-page bulletin dealing with the use of Permutit for water rectification for boiler plants, municipal supplies and other purposes, and another of 22 pages dealing with its use in the textile industry; each 8½x11. Also two pamphlets on the use of Permutit for reducing boiler-plant costs, one 16-page and the other 20-page, each 6x9.

D'OLIER PUMPS

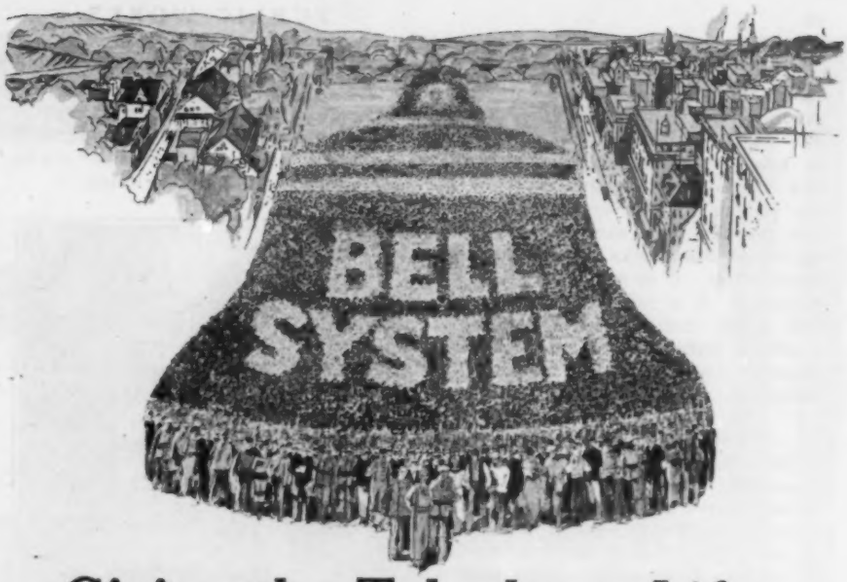
658. Illustrations and brief description of large pumps recently built. 4 pages, 8x10½.

THE DELAVAL FLEXIBLE COUPLING

659. The DeLaval Steam Turbine Company, Trenton, N. J., describes a flexible coupling for use with high and moderate speed machinery. 12 pages, 8½x11.

HOLLOWSPUN STANDARD

660. The Massey Concrete Products Corporation of Chicago describe some recent uses of their hollow concrete lighting standards and telegraph poles. 4 pages, 8x10½.



Giving the Telephone Life

Wherever your thought goes your voice may go. You can talk across the continent as if face to face. Your telephone is the latch to open for you any door in the land.

There is the web of wires. The many switchboards. The maze of apparatus. The millions of telephones. All are parts of a country-wide mechanism for far-speaking. The equipment has cost over 2 billion dollars, but more than equipment is needed.

There must be the guardians of the wires to keep them vital with speech-carrying electrical currents. There must be those who watch the myriads of tiny switchboard lights and answer your commands. There must be technicians of every sort to construct, repair and operate.

A quarter of a million men and women are united to give nation-wide telephone service. With their brains and hands they make the Bell System live.

"BELL SYSTEM"

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

AND ASSOCIATED COMPANIES

One Policy, One System, Universal Service and all directed toward Better Service

SULLIVAN DRILL

661. The Sullivan Machinery Company of Chicago describes its newest water hammer drill, the DW-64, in a 16-page pamphlet, 6x9.

SULLIVAN AIR COMPRESSORS

662. The Sullivan Machinery Company of Chicago issues a new catalogue describing its portable gasoline engine-driven air compressor, WK-311, and its angle compound belt-driven air compressor, WJ-3. 10 pages, 8½x11.

A Good Man for Your Sales Department

I have had exceptional experience selling Machinery for Contractor, Mine, Mill and Shop. Have finished present work and am ready to consider any fair proposition with a High-Grade Company. Valuable as Salesman, Commercial Engineer, District Representative, etc. Address Box N. E. O., care Public Works, 243 West 39th St., New York.

Louisville, Kentucky, in two sizes, one cubic yard and one-and-a-half cubic yards. This chute hooks on to the side of the railroad car and is filled by hand while the wagons are away, and dumps into a wagon or truck by the pulling of a lever, filling it in a few seconds, thus avoiding any holding-up of the trucks to wait for slow hand-filling. It is easily attached and detached. It is ruggedly built of steel and angle iron and will handle all kinds of bulk material such as sand, crushed stone and other road-building materials.

FLASHING TRAFFIC BEACON

The American Gas Accumulator Company of Elizabeth, New Jersey, manufactures a flashing traffic beacon which is being used for regulating traffic in a great many cities as well as on highways. Since this was first introduced and described by us three or four years ago it has received a number of improvements. It uses acetylene light and so requires no wiring, but can be used anywhere. It is not affected by weather. The pavement need not be cut into but the beacon may be fastened to the top of a substantial concrete base that rests on the pavement. The sharp flash compels motorists' attention. The lens may be of red, yellow or green, the different colors generally being used to designate different warnings. The beacon will flash continuously for six months without recharging. The beacon and its supporting tower stand prominently and at a considerable elevation so that they cannot be overlooked by day any more than by night and thus serve as effective traffic guides throughout the 24 hours.

A. G. A. TRAFFIC BEACON IN DAYTON, O.

JONES ROAD MAINTAINER

The Jones Road Machine Corporation of Galva, Ill., manufactures a power control road maintainer in four sizes, No. 1 having cutting blade 16½ feet long; No. 2 14½ feet; No. 3 12½ feet, and No. 4 11 feet. Each carries a smoothing plate the full length of the blade, 6 inches wide for the No. 1 and No. 2 and 5 inches wide for No. 3. No. 1 requires a 25-50 or a 30-60-horse-power tractor; No. 2 a 12-25 or a 15-30 horsepower tractor, No. 3 10-20 or a 13-25-horsepower and No. 4 a 8-16 tractor or a medium light truck.

The blades may be raised to any height by merely shifting the long lever, the travel of the machine effecting this by bringing the proper gears into mesh. The spread of the blades can similarly be diminished or they can be entirely folded in. A separate control is provided for each blade operating instantly and easily, adapting a machine to narrow roads or for crossing bridges or to permit the passing of approaching vehicles. The beams are also provided with a tilting arrangement for regulating the cut of the blade. A single operator easily controls the machine from a platform in the rear, whence he has an unobstructed view of the road ahead. This maintainer is not intended to take the place of a grader, but will maintain a road at lower cost, it is claimed, than can be done otherwise.

The company also makes a power control road grader requiring 20 to 25-horsepower which also is provided with the power lift; also double lever and single lever road drags.

NEW MODEL OF "HIGHWAY LIGHTHOUSE."
Just released. Finished in white enamel, equipped with either red, green or yellow flashing light.

HEIL DUMP BODIES

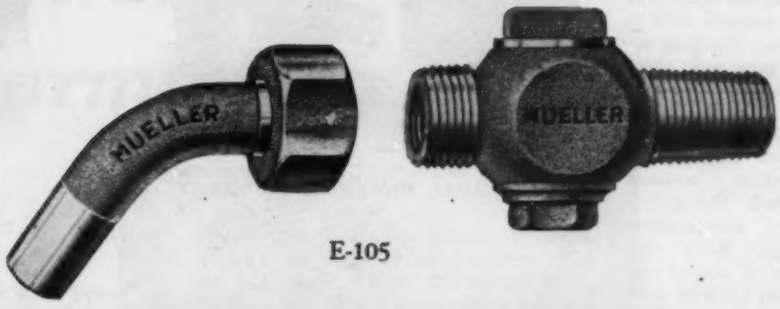
The Heil Company of Milwaukee manufactures a steel dump body with a capacity of 60 cubic feet, suitable for hauling ashes, rubbish, racked garbage, gravel, brick or almost any kind of general hauling. The sides are hinged 18 inches from the bottom to make loading easy. The tail gate is double-acting, and adjustable for spreading gravel. The body is 6 feet 6 inches long, 3 feet 10-1/2 inches wide at front, 4 feet 1-1/2 inches at the rear, and 28 inches high.

The ash and rubbish body is equipped with the new Heil underneath hand hoist. The mechanism of this is very simple, consisting of a series of gears which operate gear segments to which are bolted lifting arms. It has a dumping angle of 55 degrees. The body and hoist is adapted for use with a Ford truck.

MOSHER TWO-UNIT ASPHALT PLANT

C. C. Mosher, general manager of the East Iron & Machine Company of Lima, Ohio, has designed, and that company is now ready to place on the market, an entirely new type of two-unit portable road asphalt plant. It is complete in two units, including boiler and steam melting kettles. The plant has a capacity of 1,800 yards a day, with a 9-foot mixer and 4,500-gallon steam melting kettles, asphalt pump and a 75-horsepower boiler. It is equipped with oil burners under both drum and boiler and also with grates for burning coal, so that either fuel can be used. There are no belts, but all engines are direct driven. One of the units weighs about 17 tons and the other about 13 tons, this including every part of the plant. If desired, the plant can be operated by electric motor drive, when a smaller boiler would be used for steam melting.

An ordinary plant crew can set the plant up for operation in about 6 hours and pack it for shipment in less time. They are mounted on trucks having wheels with a 12-inch face and can be trailed over ordinary roads.



E-105

MUELLER
Corporation Stops

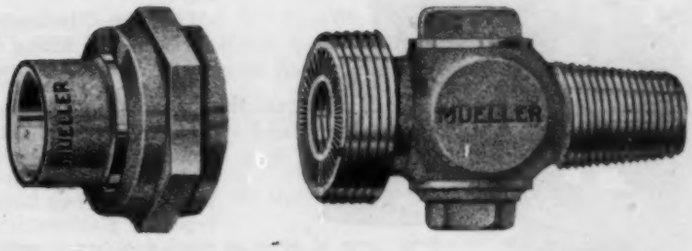
The majority of all Water Works Companies in the United States use Mueller Brass Goods—because they give absolutely dependable service.

You cannot afford to take any risks on underground work. It must stand every test for years. Mueller Corporation Stops do exactly this.

Made by master brasscrafters, from brass under exact laboratory control and tested to 200 pounds hydraulic pressure, you can always place complete reliance on Mueller Corporation Stops.

H. MUELLER MANUFACTURING CO., Decatur, Ill., U.S.A.

Branches: 145-149 W. 30th St., New York City; 1072-76 Howard St., San Francisco; 2468 Hunter St., Los Angeles



E-102

PULLEY CLUTCH FOR FORDSONS

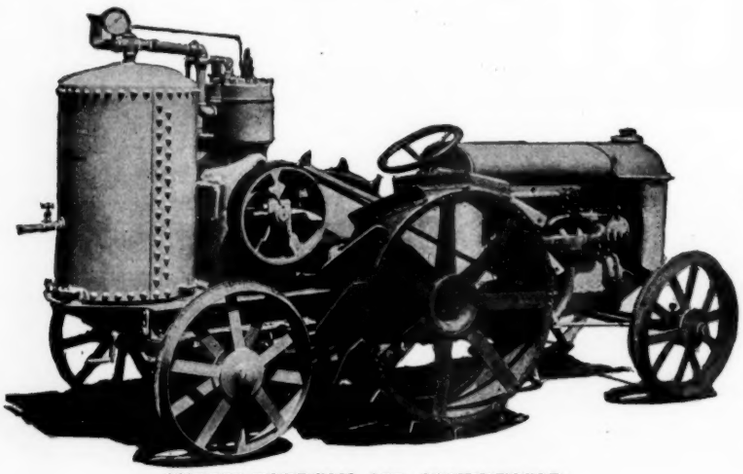
A pulley clutch for use with Fordsons is manufactured by the Dallmann Machine and Manufacturing Company, Milwaukee, which it calls the "Smith unit." This can be slipped in and bolted in place of the foot rest or the ordinary rigid geared pulley. The operator can then change instantly from tractive power to belt power by a shift of the lever, which slides a sleeve enclosing the idle pulley shaft well on to the splined live drive shaft, locking the two firmly for rigid power transmission, without changing the pulley speed. The pulley is a special laminated composition guaranteed not to slip. With this pulley, belt transmission of power can be made to any apparatus such as concrete mixer, centrifugal pump, rock crusher, etc.

CURTIS-FORDSON AIR COMPRESSOR

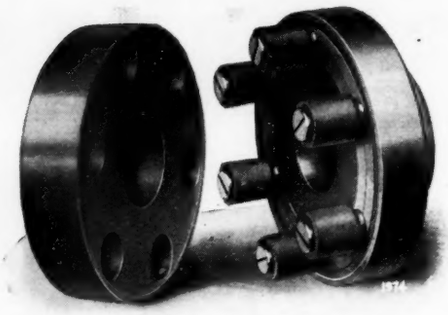
The Curtis Pneumatic Machinery Company of St. Louis is manufacturing a portable air compressor for the road contractor, structural steel work, etc., where a supply of compressed air is wanted at a distance from a stationary plant. The Curtis-Fordson outfit is a combination of an air compressor and a Fordson tractor, which latter can be used for regular tractor purposes when not operating the compressed air outfit, and also moves the compressor unit from place to place. The compressor is large enough to operate in ordinary service two jackhammer drills for 6-foot holes or any other service requiring not to exceed 90 cubic feet of air per minute. It can also be used for paving breakers, rammers and tampers, pumping water, caulking water pipes, etc.

To detach the tractor from the compressor it is necessary only to uncouple two hook brackets which clamp over the rear axle of the tractor, take off the belt and disconnect an attachment to the steering mechanism.

The compressor is a 6x6-inch Curtis Model A, single, with a 24-inch x 36-inch receiver; all mounted on an all-steel 2-wheeled trailer with legs to support it when detached.



CURTIS-FORDSON AIR COMPRESSOR.



DELAVAL FLEXIBLE COUPLING.

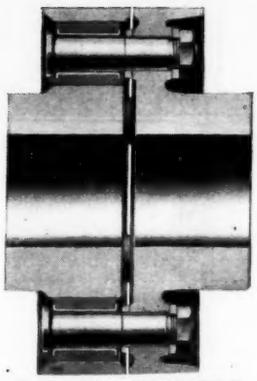
TRACTOR WINCH

The C. L. Best Tractor Company has recently developed a tractor winch that may be attached to any of their left-hand drive sixties. This winch or hoisting drum is a part of the tractor with a capacity of 300 feet of 5/8-inch cable. The installation weighs 1550 pounds and does not interfere with the other uses of the tractor. The drum may be disengaged by means of a gear control lever for winding or running out the cable, while a brake permits control of the running-out speed.

DELAVAL FLEXIBLE COUPLING

A flexible coupling is manufactured by the DeLaval Steam Turbine Company of Trenton, New Jersey, for public use. This coupling has been used by the company solely in its own machinery up to the present time. It was devolped for turbines or other motors geared or direct coupled to pumps, generators or similar machinery.

It consists of two post flanges mounted on the driving and driven shafts respectively. One flange carries bolts or pins which enter holes bored in the opposing flange, but not coming into metallic contact with the latter, as the driving force is transmitted through steel lined molded rubber bushings slipped over the pins. The rubber supplies the flexibility required to take care of inevitable slight misalignment, does not require lubrication, absorbs shocks and is long lived and reliable. There is no constraint upon independent endwise motion of the shafts and one shaft can be removed without disturbing the other. The peripheries of the flanges are ground to true cylinders and the faces to true planes to facilitate lining up. All parts are made to limit gages and all similar parts are interchangeable.



DELAVAL FLEXIBLE COUPLING.

P. & H. CORDUROY CRANES

The Pawling & Harnischfeger Company manufactures a general utility crane which is mounted on either full corduroy or half corduroy traction, thus permitting it to move over any kind of road or soil. It is driven by gasoline or electric motor. The crane and engine with the platform containing them swing in a complete circle and the hoisting and swinging motions can be performed simultaneously. The machine is used with a crane hook or clamshell bucket, or can be used with a shovel boom or with a dragline bucket or skimmer scoop for light grading.

This crane can be used in any situation, can be run off and on a flat car under its own power, is operated by one man, is guilty of no smoke nuisance and gives low cost of fuel and oil.

The crane is made in three sizes. No. 205 has a lifting capacity of 12,500 pounds at a 10-foot radius; No. 206 has a lifting capacity of 19,000 pounds at that radius, and No. 208 of 35,000 pounds. The first will handle a ½-cubic-yard bucket at 30-foot radius, the second at 38-foot radius and the third at 50-foot radius. The two larger machines steer from the platform irrespective of position of upper crane with reference to lower crane, and have two propelling speeds.

Quick Action in Heating Uniformity in Distribution

Be sure to see the ETNYRE Distributor exhibited at Booth No. G 2 to 6 in the Greer Bldg.

ETNYRE MODEL F WITH 16-FT. SPRAY BARS
Natural Drainage—Positive, Even Flow

THE ETNYRE DISTRIBUTOR

automatically

—LOADS
—HEATS
—SPREADS

asphalt, tar and liquid bituminous materials at a record rate and with minimum attention from the operator.

It is built for EFFICIENCY and LONG SERVICE.

The ETNYRE Tar and Asphalt Distributor is a complete and compact unit, which may be readily mounted upon any type of truck chassis. It combines light weight, sturdy construction and simple control, assuring maximum economy and speed in operation.

The material is heated by means of non-carbonizing burners, which pass hot gases through 3 sets of internal flues, extending the full length of the tank. This effects a rapid even temperature rise, without danger of coking or burning the material.

Natural drainage through large lines, with valves arranged for automatic circulation so that nothing but thoroughly heated material is supplied to the spray nozzles, results in a uniform, unobstructed flow and *perfect distribution.*

Get a copy of the Distributor Bulletin at the Show, or by mail on request.

E. D. ETNYRE & COMPANY

Manufacturers of Flushers, Oilers, Sprinklers, Tar and Asphalt Distributors

OREGON, ILLINOIS

BACK-DUMP BUCKET

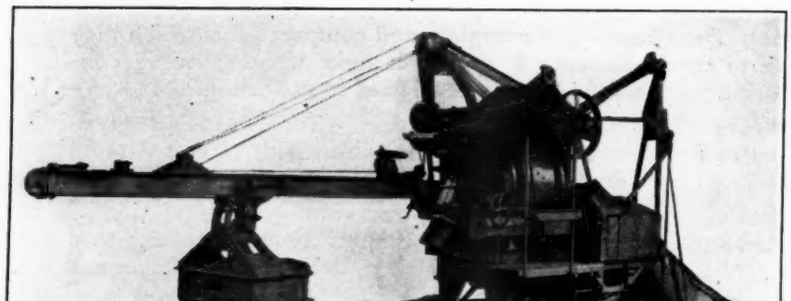
The Mansfield Engineering Company of Indianapolis manufacturers the "Pioneer" back dump bucket which it says was invented by a contractor especially for digging gravel. However, it has been used for nearly every kind of material. Used with a slack line excavator it has replaced derricks, steam shovels and clamshells, being able to dig under water and to any depth. Although at its best when digging sand and gravel, it has been used for dredging, stripping quarries and other work.

It digs, conveys, elevates and dumps in one continuous operation controlled by one man operating a 2-drum hoist. It is claimed that the back dump and rounded corners save 20% of time over any other bucket in discharging its load. The entire operation is controlled by two lines, one which loads and pulls the bucket while the other raises it by tightening the track cable. A speed of 200 feet per minute is used for loading and a traveling speed of 600 feet for the loaded bucket. It is claimed that a half-yard bucket will have a capacity of from 20 to 30 cubic yards per hour, a 1-yard capacity of 40 to 60 cubic yards and a 1½-yard bucket a capacity of 60 to 90 cubic yards.

All wearing parts are protected by heavy manganese steel plates. For ordinary material a manganese steel digging blade is used while for extra hard digging, steel teeth may be fitted over the blade. The back dump is secured by means of a construction similar to a steam shovel dipper, the door swinging wide and clear of the bucket the moment the latch is tripped.

SPECIAL CITY PAVER

The Koehring Company of Milwaukee has developed a concrete mixer especially for city paving work where a large capacity paver is desired. The special feature of this paver is a head frame to be used with its No. 21-E. The uprights supporting the sheaves through which the charging skip cables run are bolted and hinged in such a way that after the bolts are removed the upper framework may be tipped back by the skip hoist clutch, thus reducing the height of the machine and allowing it to pass beneath low telegraph wires and other obstructions. With this special frame, the minimum height of the paver is 10 feet 9¼ inches from the ground if truck wheels are used, 10 feet 11¼ inches with half-length multiplane and 11 feet 2¼ inches with full length multiplane. This arrangement also permits loading the machine on a flat car for shipment without dismantling anything except the boom and skip.



KOEHRING SPECIAL CITY PAVER

INDUSTRIAL NOTES

LINK-BELT CALENDAR

The Link-Belt Company of Chicago has, as for several years past, issued a calendar for 1924. It is 16x24 inches with a sheet for each month. The illustrations are especially artistic, having been made by the Chicago artist, Jeffrey Grant, and, while they accurately portray the construction features of the various types of Link Belt treatment, have an artistic touch unusual to illustrations of mechanical objects.

ELECTRIC TRUCK SCHOOL

The first session of a New York Electric Truck School for owners, operators and garage men was held on Wednesday evening, December 5, at 130 East 15th Street. An attendance of 130 reported for this first meeting. This was the first of a series of lectures which will be held every two weeks and will continue until May, 1924. The subject of the evening was "Chassis," by E. L. Clark, of the Commercial Truck Company and A. K. Brumbaugh, of the Autocar Company.

At the same time a representative of an insurance company gave a short talk on accident prevention and it was decided that 15 minutes at each subsequent meeting will be devoted to a discussion of this subject. The student in the school who offers the best suggestion for curing this growing evil will be awarded a suitable prize at the end of the session.

HOLT MANUFACTURING COMPANY

The Holt Manufacturing Company announces the removal of its New York office and the Mt. Vernon Service Station to 250 West 54th street, New York City, where will be located the export and eastern sales office and service department, with permanent tractor exhibits and complete parts stocks.

PAVING BRICK SHIPMENTS

Vitrified brick shipments for November ran above normal, 64% of the industry's tonnage reporting 21,689,000 total shipment. Unfilled orders on hand were reduced from 64,531,000 in October to 54,535,000 in November. For the time since last spring the total number manufactured during the month greatly exceeded the shipments, showing the preparations by the company for the early spring's demand.

THE AVERY COMPANY

The Avery Company, in spaces 29 and 30 at the National Good Roads Show, will exhibit a one-man power-lift road razor, a track runner operated by an electric motor and a 25-50-horsepower 10-ton road roller tractor with power scarifier. The exhibition will be in charge of J. J. Coates, manager of the Peoria Sales Division, and F. W. Gray, manager of the Distributors Division, and other branch house managers and salesmen.

UNITED STATES CAST-IRON PIPE AND FOUNDRY COMPANY

The following changes have been made in the sales force personnel: H. A. Hoffer is eastern sales manager with headquarters at 121 Chestnut St., Philadelphia; G. T. Overholt is acting New York sales agent with headquarters at 71 Broadway; and Thomas Simons is Kansas City sales agent with headquarters at Interstate Bldg., Kansas City, Missouri.

EASTERN PAVING BRICK MANUFACTURERS' ASS'N.

Irvin S. Badger has been appointed Northern District Engineer of this association, with headquarters at 909 Westcott St., Syracuse, N. Y. He has had fifteen years of engineering experience, three in charge of road construction for the New York State Highway Department, and is ready to co-operate with engineers and contractors in designing and constructing brick pavements.

NEWS OF THE SOCIETIES

CALENDAR

Feb. 25-28—AMERICAN CONCRETE INSTITUTE. Annual convention, Chicago. Secretary, Harvey Whipple, 1807 East Grand Boulevard, Detroit.

March 5—BOSTON SOCIETY OF CIVIL ENGINEERS—SANITARY SECTION. Annual meeting.

April 7-10—NATIONAL CONFERENCE OF CITY PLANNING. Annual conference at Los Angeles, Cal.

April 9-12—AMERICAN SOCIETY OF CIVIL ENGINEERS. Spring meeting at Atlanta, Ga.

May 12-14—AMERICAN ASSOCIATION OF ENGINEERS. Annual meeting at San Francisco, Cal.

May 19-23—AMERICAN WATER WORKS ASSOCIATION. Annual convention at Hotel Astor, New York City. Secretary, J. M. Diven, 153 West 71st St., New York.

June 23-28—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting at Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

NEW ENGLAND WATERWORKS ASSOCIATION

The January meeting of this association was held in Boston on January 8, at which two papers were read, the first entitled "Determining the Mean Rainfall on a Drainage Basin," by Robert E. Horton of Voorheesville, New York; and the other entitled "Copper Sulphate Treatment of Cape Pond, the Source of Water Supply for Rockport, Massachusetts," by E. Sherman Chase of Boston, Massachusetts.

Mr. Horton in his paper discussed early experiments made in Europe by Kemp, and the interpellation of rainfall rates at an intermediate point when rates had been determined by gauges at two or more points on a drainage basin. He believed that such interpellations could be made with an error of not to exceed 15 to 20% when readings of four gauges were available. The paper was discussed by Charles W. Sherman, H. K. Barrows, Caleb M. Saville, X. H. Goodnough, George H. Marston, Prof. Dwight Porter and George Carpenter.

Mr. Chase in his paper stated that Cape Pond is a natural pond, located 1 mile from Rockport and 1 mile from the ocean. After the third application of copper sulphate, disagreeable tastes and odors had been removed, but the second and third applications had been rather heavy and resulted in destruction of considerable fish life. A filtration plant is now being built for this water. This paper was discussed by Prof. George C. Whipple, M. C. Whipple, Henry A. Symonds and F. E. Winsor.

The Executive Committee announced that at a meeting held prior to the meeting of the Society it was decided that the next convention be held at Rochester, N. Y., some time in September.

WATER WORKS MANUFACTURERS' ASSOCIATION

In connection with the 44th annual convention of the American Water Works Association, to be held at the Hotel Astor, New York, May 19 to 23, there will be an exhibit, which will be in charge of a committee of the Water Works Manufacturers Association. This committee, which was appointed in January, is as follows: Chairman, J. E. O'Leary, Pittsburgh Des Moines Steel Co., 50 Church St., New York City; J. D. Capron, U. S. Cast Iron Pipe Co., Burlington, N. J.; Chas. M. Reed, Central Foundry Co., 41 E. 42nd St., New York City.

BOSTON SOCIETY OF CIVIL ENGINEERS

A joint meeting with engineering students of Harvard, M. I. T., Tufts and Northeastern University will be held on February 20 and addressed by Allen Hazen on "The Treatment of Hudson River Water at Albany and Poughkeepsie, N. Y."

The annual meeting of the Sanitary Section will be held on March 5 at 7:45, when Stephen D. Gage, sanitary engineer of the Rhode Island Board of Purification of Water, will present a paper on "The Control of Pollution by Oil of Public Waters in Rhode Island." There will also be an election of officers.

NATIONAL DRAINAGE CONGRESS

The twelfth annual meeting of the National Drainage Congress, held at St. Louis on January 16th and 17th, was attended by 126 delegates from all parts of the United States. Jacob A. Harman, the outgoing president, told of the development of drainage in the past decade and outlined the growth of the Drainage Congress and its present improved financial condition. Joseph Hyde Pratt declared that one of the first objects of legislation should be to extend assistance to settlers who are taking up reclaimed land, this to be in the form of a loan and other assistance that will enable him to derive a profit from the land. At the closing session the conference pledged support to speedy completion of all approved projects for inland waterways, advocating national and state legislation to set aside lands unsuitable for agriculture for use as game preserves, and recommended increased federal appropriations for intensive study of economics of land reclamation. One speaker stated that approximately 3.8% of the total area of the United States is contained in the various drainage enterprises, which will cost when completed an average of $6.64 an acre.

The officers elected for next year were: President, Charles H. Young of Muscatine, Iowa; first vice-president, E. V. Willard of St. Paul, second vice-president, Ray N. Towl of Omaha; third vice-president, Herman J. Sternberg of St. Louis; fourth vice-president, L. L. Hiddinger of Memphis; secretary, C. R. Thomas of Chicago; directors, the above officers and Joseph Hyde Pratt, L. A. Jones, L. K. Sherman, A. J. Bracken, E. R. Jones and Clark E. Jacoby.

ASSOCIATED GENERAL CONTRACTORS

The Associated General Contractors of America held its annual convention at Chicago, January 21st to 24th, following the convention of the Road Builders' Association in that city, Among the addresses delivered was one by Gordon A. Ramsay on "Codification and Standardization of Federal Contract Laws." Mr. Ramsay had been appointed assistant to General Dawes, the director of the Bureau of Budget, his specific work having been to humanize contracts between the Government and those with whom it entered into contracts. He is now working on a draft of a new contract federal law, suggestions on which he welcomes from contractors, architects and engineers, with a view to ultimately having the contract procedure of the Government as nearly in accord with that of commercial usage as possible.

Fourteen resolutions were adopted by the Convention, including the following: Joining with the American Association of Highway Officials and representatives of the surety companies for a complete and impartial analysis of the bonding situation with a view to finding a proper solution for the issues confronting bonding companies and contractors. Urging its membership to educate the public on the results of day-labor method of doing public construction and endeavoring to secure legislation requiring public bodies to do public construction by contracts guaranteeing completion at a fixed price. Urging citizens, and especially bankers, to aid them in resisting the improper aggressions of unscrupulous labor leaders. Endorsing Secretary Mellon's plan for reducing taxes. Approving the creation of a national department of public works. Urging legislation that will compel private transportation companies to pay their share of the cost of the highways. Urging Congress to refrain from any changes in the transportation act until longer time has been given to demonstrate the soundness or unsoundness of its provisions. Offering its cooperation in the establishment of apprenticeships and in the training of apprentices. Requesting the cooperation of engineering and architectural societies in securing plans and specifications that more

clearly define the scope of the work to be performed.

The committee on labor reported that, in June, 1923, contractors employing 32,000 workmen were short of men about 31%; the shortage ranged from 3% for engineers to 57% for lathers; and recommended as remedies increased immigration, training apprentices, and more winter construction. This report received lengthy discussion, several arguing for developing promising workmen into skilled men instead of training boys as apprentices; but the latter idea was finally adopted.

The contractors discussed practices of bonding companies which were causing much trouble and expense to many of the state highway departments, and authorized a committee of the association to confer with one of the Association of State Highway officials and one of the surety bonding companies to endeavor to agree on a remedy for the unsatisfactory condition.

Performing public work by day labor was condemned, Arthur S. Bent giving the principal address on this topic, and it was urged that laws be obtained requiring public officials to keep and publish full records and cost data of all work so done. Other laws advocated were those continuing Federal aid for roads, providing relief of navy contractors, adjustment of compensation, retained percentages, payment for materials, and arbitration. It was reported that nine interested societies had agreed upon a form of "general conditions" for contracts, and special conditions for building and railroad work, with others probable in the near future.

The Committee on Methods urged lengthening the construction season, although stating that winter work was not recommended as economical or desirable in every case. It recommended quantity surveys by self-sustaining bureaus, and standardization of the practices of such bureaus. It urged adoption of a national safety code and co-operation with the National Safety Council.

The officers elected for the coming year were: President, Frederick L. Cranford of Brooklyn, New York; vice-president at large, A. S. Downey of Seattle; vice-presidents, Leonard C. Watson of Boston and H. H. Wilson of Harrisburg, Pa.; directors, W. A. Rowan of New York, T. J. Baker of Milwaukee, Henry Erickson of Chicago, Natt MacDougal of Portland, Oregon, and H. W. Baum of Salt Lake City.

ENGINEERING INSTITUTE OF CANADA

The annual meeting of the institute was held in Ottawa, January 23 and 24. Dr. Charles Camsell, deputy minister of mines, told of plans made by the Canadian government for obtaining fuel when Pennsylvania anthracite shall no longer be available. The subject of the development of the St. Lawrence River was discussed at great length. Walter J. Francis was elected president, and J. B. Challies, F. P. Shearwood and F. A. Bowman vice-presidents.

AMERICAN ROAD BUILDERS ASSOCIATION

The convention of this association, together with the road show, was held in Chicago January 15 to 17. About 14,500 were registered as attending, and those present at the meetings were at times more than the audience hall would seat. The exhibits, of which there were 215, overflowed the Coliseum into other buildings near by.

The program of papers and discussions followed closely that published in the December issue of PUBLIC WORKS. Tuesday afternoon was devoted to "Materials and Design." Under this head "Recent Development of Bituminous Base and Sand Asphalt Road Construction" was described by E. R. Olbrich.

On Wednesday "Traffic and Maintenance" and "Administration" were the topics discussed. Among other papers was one entitled "Snow Removal Methods," by Edward E. Reed, of the New Jersey State Commission, who stated that the whole 726 miles of the state system is kept open in winter, being divided into sections approximately 12 miles long. This year 47 sections will be handled by contractors and 12 by the state maintenance forces. Trucks provided with scraper blades or snow plows are used largely by the contractors, while crawler tractors used by the maintenance gangs on gravel roads will be used by them in snow removal also.

Maintenance methods in Wayne County, Michigan, were described by Leroy C. Smith. There are 300 miles of concrete roads in the county. Central plant maintenance of them is carried on from two yards so located that the maximum haul is 15 miles. In these yards are kept the trucks and other machinery used by the gangs, oil in tanks, cement, etc. Mr. Smith described the various kinds of equipment used and, in general, the work done.

B. F. Piepmeier, state highway engineer of Missouri, and C. N. Connor, constructing engineer of North Carolina State Highway Commission, discussed the matter of state purchase of cement. Mr. Piepmeier stated that, on account of the limited supply of cement required by Missouri, it did not attempt to build a cement plant, but arranged with private stockholders of an up-to-date plant to transfer a portion of the cement company's stock to the state highway commission as trustees, thereby enabling the department to acquire a large portion of its cement at actual cost. In Missouri the cement problem is less important than that of sand, gravel and stone, and during the past few months the state has purchased sand and gravel deposits and stone quarry sites. It estimates that it has saved the state $3,000,000 by its wholesale purchase of materials. In North Carolina the state highway commission has been furnishing cement to contractors on a large scale since the spring of 1921, and calculates that it has saved approximately $350,000 over the cost had the contractor secured the cement through local jobbers. This is largely because in 90% of the cases the contractors could not have taken advantage of the discount, while the state can.

On Thursday afternoon "Construction" was the subject for discussion, one of the papers being on the curing of concrete roads, by H. F. Clemmer.

There was general praise of the admirable work of Charles M. Upham as manager of the show, in recognition of which he was presented with a very complete radio set.

WESTERN SOCIETY OF ENGINEERS

The annual "mid-winter convocation" was held February 6 and 7 at Chicago, Ill., at which transportation and development in that city were discussed. The papers discussed pedestrian and roadway traffic—bus, cab, street railway, elevated and suburban steam lines—and suggestions for improving transportation; especially a comprehensive program for transportation improvement, prepared by a special committee of the society.

AMERICAN ENGINEERING COUNCIL

Representatives of national engineering societies on the executive board of the council for the coming year have been chosen as follows:

A. S. M. E.—M. E. Cooley, A. M. Greene, Jr., F. K. Copeland, L. P. Alvord, Fred R. Low, Fred J. Miller.

A. I. E. E.—J. H. Finney, Dugald C. Jackson, C. E. Skinner, F. B. Jewett, L. F. Morehouse.

A. S. S. E.—M. G. Lloyd.

A. S. A. E.—S. H. McCrory.

A. I. C. E.—H. E. Howe.

The St. Paul Engineers' Club has been admitted to membership in the council.

PERSONALS

Diven, J. M., has resigned as secretary of the American Water Works Association, the resignation taking effect February 1. He recently became superintendent of water works of Troy, N. Y., as announced in our January issue.

Elliott, John L., city engineer of Indianapolis, has been elected president of the sanitary commission of that city, a distinct state-governed body.

Gallagher, J. F., has recently been elected executive secretary of the Illinois Association of Highway and Municipal Contractors, with office in Chamber of Commerce, Chicago.

Gordon, Fred G., formerly principal assistant to Dabney H. Maury, of Chicago, has become associated with him as partner under the firm name of Maury & Gordon.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

ORNAMENTAL LITTER CAN

A street can for receiving paper and other litter that might otherwise be thrown on the street is manufactured by the Ornamental Street Cabinet Corp. of Dayton, O., the president of which, Raymond H. Boyer, is the designer. It is constructed of cast iron, bronze, glass and enameled sheet metal. The general color is dark statuary bronze, with the base and roof a dark sea-green enamel. On the top is a street name sign with white letters in a maroon glass background, illuminated from the inside. Just below the roof is a swinging door on each side finished in blue enamel with aluminum plates. Below brass rails there is on each side a frame of statuary bronze highly embossed in which are placed heavy plate glasses behind which are placed hand-painted posters illuminated by lamps on the inside and used for advertising. Below these on each side is a dark green enameled panel carrying a slogan in white letters. The cabinets are waterproof and fireproof and probably the most ornate ever devised.

They are placed on the sidewalk at the curb about thirty feet from the street intersection. Current for the lights is obtained from the lighting standards by a connection laid under the sidewalk. It is stated that cities of over 200,000 population can obtain them without cost by permitting the use of the advertising spaces.

ORNAMENTAL LITTER CAN.

A NEW STRIKE-OFF

J. Wm. Heltzel, of The Heltzel Steel Form & Iron Company, Warren, Ohio, has developed and placed on the market a new hand strike-off, which consists of a channel of proper width and thickness, and crowned to conform to specifications. An adjustable truss is provided, securely fastened to and parallel with the channel, and so arranged that the crown in the strike-off may be either increased or decreased as desired. It is always possible to keep the proper crown as well as change it when desired. In a strike-off of 8 ft. width it is possible to change the crown ¾ inch, while in an 18 ft. width, twice this amount is possible.

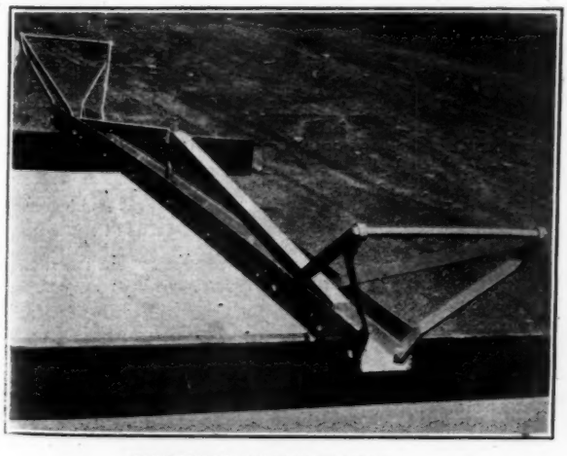
Suitable handles are provided for the operators, who can also use the machine for tamping purposes as well as striking off.

UNION CENTRIFUGAL PUMPS

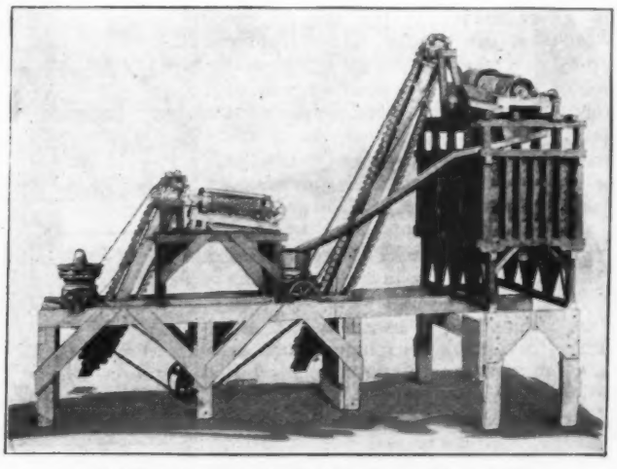
The Union Steam Pump Company of Battle Creek makes centrifugal pumps of sizes from ¾-inch up to 8-inches multi-stage, with capacities of from 5 gallons per minute to 6,000 and from 50 pounds to 250 pounds working pressure. It claims these pumps to be simple, powerful, durable and inexpensive. The cylinders are brass-lined and the piston rods of bronze. The pump and the power frame are combined in one casting. The "Unique" power pump is made in capacities of from 6½ gallons per minute to 42½ using suction and discharge pipes of 1-inch for the smallest up to 2 inches for the largest and up to 180 feet lift above the pump. It claims to pump 25,000 gallons of water 50 feet high on one gallon of gasoline. It is recommended for suburban water systems and those for country residences.

MODEL TELSMITH CRUSHING PLANT

The Smith Engineering Works of Milwaukee exhibited at the Road Show last month a working model of a crushing plant which actually operated, driven by a 1½-horsepower motor, reducing stone from 1-inch down to ¼-inch and under. The coarse crushing was done by a miniature primary breaker 12¼ inches in diameter with 2-inch feed opening and 7 x 2-inch drive pulley, which was aquipped with a complete automatic



HELTZEL STRIKE-OFF.



MODEL OF TELSMITH CRUSHING PLANT.

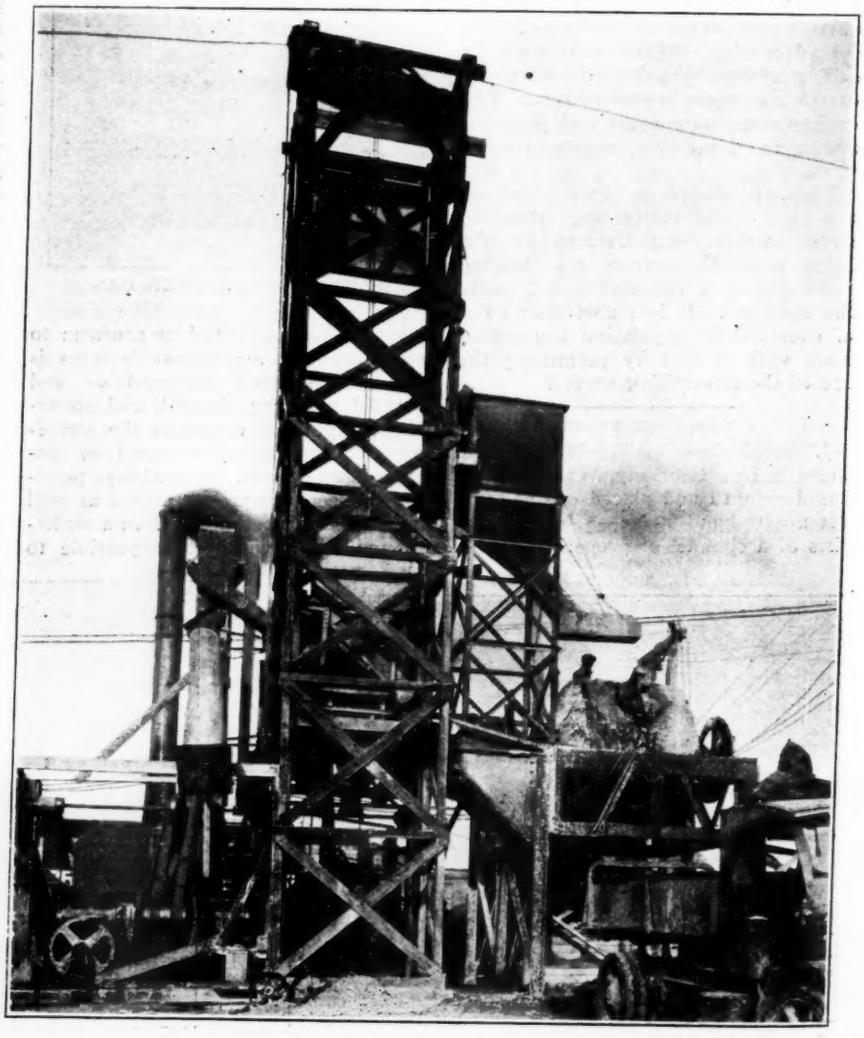
oiling system. The coarser rock from this crusher was recrushed in a reduction crusher, reducing it to ⅛-inch size; this machine being about 10 inches diameter with a 7 x 2-inch pulley and a ¾-inch feed opening. The plant was equipped with 6-inch scalping and finishing screens and with continuous bucket elevators equipped with 2¼ x 1⅛ x 1½-inch buckets. The bin was 18 in. x 3 ft. 4 in. The several items of this miniature plant were exact reproduction of similar plant furnished by the Smith Engineering Works for road contractors, miners, gravel and quarry operators.

FINLEY ASPHALT MIXER

An asphalt mixing plant embodying some new principles is constructed by Sam E. Finley, of Atlanta, Ga., and is being used for paving work in that city and other parts of the state. The mixer unit consists of a cylindrical steel shell 7 ft. diameter and 4 ft. long, with convex ends, the inner surface of which is fitted with Z-bar blades. This revolves around a horizontal hollow axis, to which is attached, inside the cylinder, a hollow spray bar fitted with conical spray nozzles which remains vertically above the axis as the cylinder revolves, supporting the nozzles near the top of the mixer. An opening in the shell of the cylinder, fitted with an air-tight cover, serves for introducing the aggregates and discharging the mixture.

The cylinder is stopped with the charging hole at the top and sufficient hot aggregate is introduced from the bins to fill the cylinder about 40 per cent. full, or to make 7,000 lbs. of hot mix. The air-tight cover is then fastened on and the cylinder begins to revolve at about 8 revolutions a minute. The Z bars cut through the aggregates, move them from end to end, and in a few revolutions the mixture is homogeneous as to screen sizes. Asphalt at the correct temperature is then sprayed through the nozzles, while the aggregates continue to be cascaded from the Z-bar blades at the top of the cylinder to the bottom. This secures a thorough mixing of aggregates and asphalt. When the desired amount of asphalt has been admitted, compressed heated air is forced into the mixer through the asphalt pipe until the pressure in the cylinder reaches about 70 lbs. per square inch. The pressure is then released, the mixer stopped with the charging hole at the bottom, the cover removed, and the hot mix discharged into a truck ready for use. The mixer has a capacity of ten batches of 7,000 lbs. each per hour.

The advantages claimed are: 1—Uniformity of product—large batches with uniform mixture throughout. 2—Saving in power and in labor. 3—Control of the thickness of the bituminous film—thin films minimize movement of asphalt pavement. 4—A full truck load mixed at one batch, thus conserving and equalizing temperature and reducing probability of errors in weighing. 5—Entire surface of all aggregates, including fissures and re-entrant facets, coated with asphalt; ordinary mixing, without air pressure, does not effect this. 6—Impregnation of the surface of the aggregate and filler, thus completely waterproofing the mix and preventing water from getting between the aggregates and the bituminous film. 7—Allows the use as aggregate of material coated with clay and other finely divided inorganic matter, because the bitumen is forced through such coating and into the aggregate itself. 8—Lessening of effect of gasoline or oil dripped onto the pavement. 9—Allows an indefinite increase in percentage of filler without lessening the uniformity. A homogeneous mix has been secured using as high as 35 per cent. filler, and increasing amount of filler increases the tensile strength of asphalt pavement.

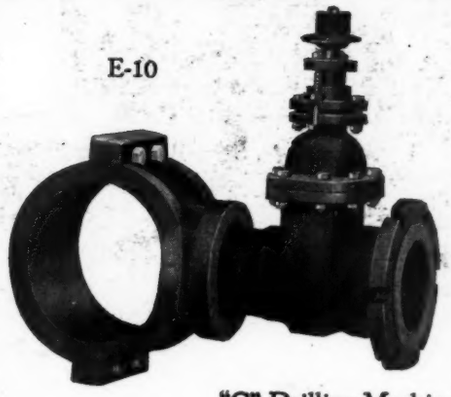


FINLEY ASPHALT MIXER (MIXING DRUM AT RIGHT, WITH CLOSED CHARGING HOLE NEAR THE TOP).

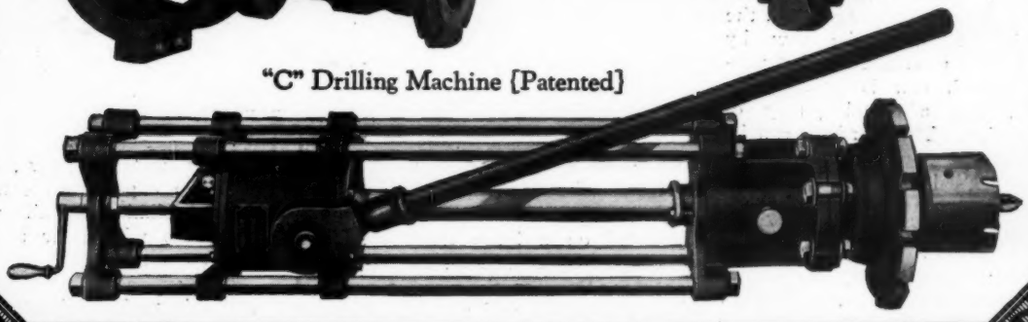
THE DALMCO SAW RIG

The Dallmann Machine & Manufacturing Company of Milwaukee is producing a new saw rig of all-steel construction to be used with a Fordson tractor. Strength and light weight are obtained by the use of channel steel throughout the frame of the rig. In attaching it to the tractor, the steel bail is first slipped behind the radiator cap and the apparatus is then lowered until the channel steel frame is snug against the radiator shell so that what pressure there is is distributed over the largest possible surface. Two wing nuts, one on either side of the radiator shell, are then tightened by hand, and two forked braces are slipped over the front axle and steel pins dropped into the holes provided. No bolt, nut or screw of the tractor is touched.

The saw itself is enclosed at rear and top by heavy steel fenders to protect the workmen, and in front by a heavy arched lumber stop which helps to keep the stock to be sawed at right angles to the saw itself and prevents



"C" Drilling Machine [Patented]



The New MUELLER Drilling Machine No. "C"

For making lateral or branch connections in gas or water mains, the New "C" Machine has no peer for speed and ease of operation.

The ratchet handle, inclosed bevel gear drive, automatic feed, and skeleton form of construction are all features that insure superior service in making connections from 2″ to 8″ inclusive, in pipe from 4″ to 48″ in size.

Shipped in a good strong, nicely painted box which answers as a permanent chest. Regular compartments for tools.

Write for detailed information and prices.

H. MUELLER MANUFACTURING CO., Decatur, Ill., U. S. A.
PHONE BELL 153

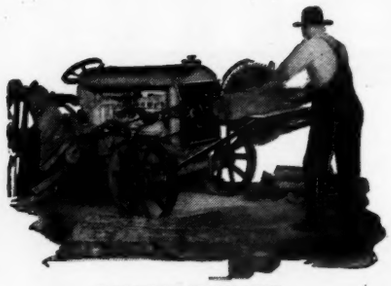
Water, Plumbing and Gas Brass Goods and Tools

New York City, 145 W. 30th St.
Phone Watkins 5397

Sarnia, Ontario, Canada

San Francisco, 635 Mission St.
Phone Sutter 3577

Mueller Metals Co., Port Huron, Mich., Makers of "Red Tip" Brass Rod; Welding Rod; Brass and Copper Tubing; Forgings and Castings in Brass and Bronze; also Brass Screw Machined Products.



DALMCO SAW RIG.

it from rolling against the saw prematurely. An added safeguard is an automatic safety carriage release; the carriage with the wood to be sawed cannot be moved toward the saw until the operator has released the saw by means of a lever provided for that purpose. A 30-inch saw is provided of high-grade, and a wood pulley of standard design. The Fordson can be driven while the saw rig is attached. It is recommended that the Smith unit be used, inasmuch as sawing wood requires quick clutching and declutching of the belt power; although the conventional solid pulley may sometimes be used. This rig is sold only through authorized Fordson dealers.

KEYSTONE 1924 SHOVEL

The Keystone Driller Co., of Beaver Falls, Penn., is bringing out this year (the tenth year of the Keystone shovel) a half-caterpillar mounting, known as model 4-24. It weighs 15 tons with wheel traction and 16 tons with front crawler. In the latter the sills extend 22 inches to accommodate the steering wheels at the boiler end. The machine is regularly equipped with a 40x86 in. boiler, but can be furnished with electric motor or gas engine drive if desired. The crawler tread is placed under the digging end of the machine, where the greatest weight and stress comes; experience with a dozen machines last fall and winter demonstrating the success of this construction.

The ⅝ yard skimmer bucket has an exceptionally long horizontal crowd—14 feet—which renders it peculiarly adaptable to street and road excavation.

By means of a special hinged boom extension, shown in the illustration, the machine may be used for digging ditches, using a drop-bottom, pull-stroke ditcher. The bottom of this bucket is hinged at the teeth and latched at the outer end. When the bottom is dropped it swings far enough on its hinge axis to aid in expelling any material that may be stuck in the bucket. Even the narrowest widths are self-cleaning in sticky materials. The bucket is made in seven widths—14 in., 18 in., 24 in., 30 in., 36 in., 42 in., and 54 in. Ditches can be dug 16 to 18 feet deep, and 300 to 600 cubic yards of earth be handled in ten hours.

SCHRAMM AIR COMPRESSOR ON TRUCK.

SCHRAMM PORTABLE AIR COMPRESSOR

An engine-driven air compressor mounted on a 1-ton truck has been developed by Schramm, Inc., of West Chester, Pa., for the use of contractors, companies and municipalities for cutting asphalt and concrete pavements, calking joints, tamping backfill, etc.

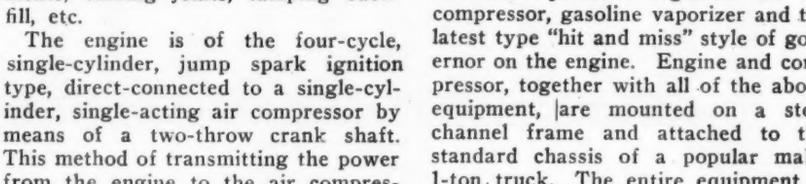
The engine is of the four-cycle, single-cylinder, jump spark ignition type, direct-connected to a single-cylinder, single-acting air compressor by means of a two-throw crank shaft. This method of transmitting the power from the engine to the air compressor not only eliminates all chains, belts, gears and other transmission apparatus, but it makes it possible to set the engine and compressor side by side, requiring a minimum of space and power. The throws of the crank shaft being set 180 degrees apart makes it possible for the engine piston to be traveling in one direction while the compressor piston is traveling in the opposite one. This contributes toward a well-balanced outfit which operates practically without vibration.

Large water hoppers, cast integral with the engine and compressor cylinders, eliminates all water-cooling apparatus with their attendant leaky pipe connections.

The entire equipment is complete with air tank, pressure gauge, safety valve, drip cock, battery and tool box, automatic pressure regulator on the compressor, gasoline vaporizer and the latest type "hit and miss" style of governor on the engine. Engine and compressor, together with all of the above equipment, are mounted on a steel channel frame and attached to the standard chassis of a popular make 1-ton truck. The entire equipment is housed in detachable canvas curtains, which can be lowered to protect the outfit while not in use.

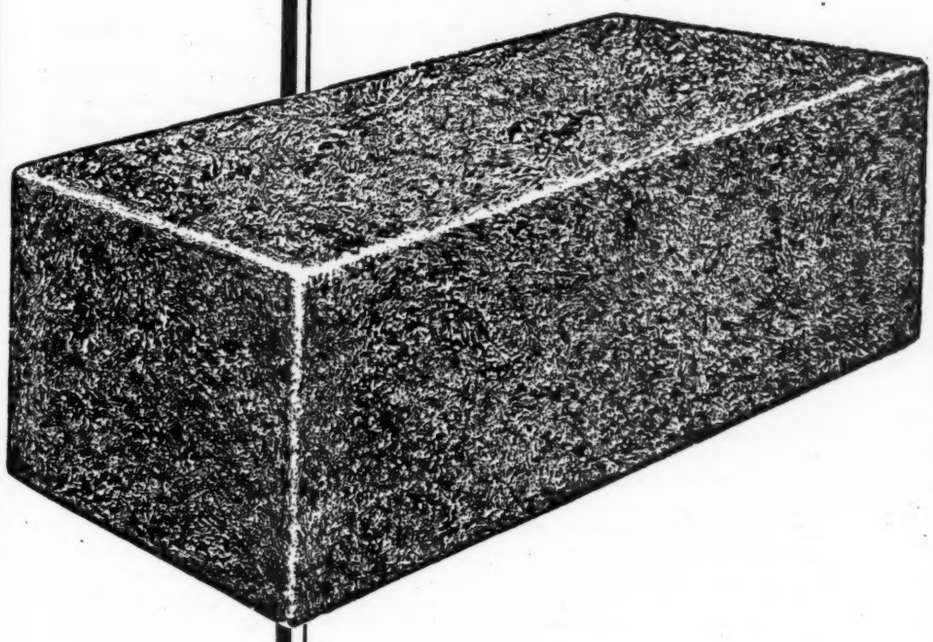
AK-WA-FELT

This is the name applied by the U. S. Asphalt Refining Company of New York to a new product which it has just placed upon the market, being an asphaltic material designed for cold application for repairing sheet asphalt, asphaltic concrete, asphalt macadam, brick, cement concrete and macadam;



KEYSTONE 1924 SHOVEL

The *Modern* Pavement—



Albion Shale Brick Company
Albion, Ill.
Alton Brick Company
Alton, Ill.
Barr Clay Company
Streator, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Corry Brick & Tile Company
Corry, Pa.
Francis Vitric Brick Company
Boynton, Okla.
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hammond Fire Brick Company
Fairmont, W. Va.
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Mack Mfg. Company
Wheeling, W. Va.
C. P. Mayer Brick Company
Bridgeville, Pa.
Medal Paving Brick Company
Cleveland, Ohio
Metropolis Paving Brick Co.
Pittsburg, Kans.
Metropolitan Paving Brick Co.
Canton, Ohio
Mineral Wells Paving Brick Co.
Mineral Wells, Texas
Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co.
Murphysboro Ill.
Patton Clay Mfg. Company
Patton, Pa.
Peebles Paving Brick Company
Portsmouth, Ohio
Pittsburg Paving Brick Company
Pittsburg, Kansas
Purington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Company
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veedersburg Paver Company
Veedersburg, Ind.
Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
Baltimore, Md.

GOOD as were the faithful old brick pavements we have known and used, many of them veterans of thirty years and more of hard service, the modern brick pavement is, nevertheless, in a class far above them.

Improvements in design as well as scientific development of paving brick manufacture have given entirely new standards of endurance to the time-tried and time-proved

VITRIFIED
Brick
PAVEMENTS
THEY OUTLAST THE BONDS

NATIONAL PAVING BRICK
MANUFACTURERS ASSOCIATION
ENGINEERS BLDG. CLEVELAND, OHIO

The "ABC" of Good Paving

A *Asphalt for Filler*
B *Brick for Surface*
C *Crushed rock, gravel, Crushed slag or Concrete for Base*

—and the "D" is drainage adequate and well-planned

Insist on A, B, C and D and you have the ideal modern pavement for city street, country road or industrial driveway. Let's start "from the ground up" and discuss the reasons why.

Drainage, adequate and well-planned, comes first because no material or design can resist the havoc played by faulty drainage with its resultant shifting of sub-soil in spring, summer and autumn and the upward thrust of freezing in the winter.

Next, an adequate foundation —many times a well compacted, sandy soil, but more often a sturdy base of concrete, crushed rock, crushed slag or gravel, according to relative costs and convenience of local sources of supply—overlaid with a uniform bedding course of sand of even density, the whole forming an adequate road-bed when protected from direct impact and abrasion by a top armor of brick.

Third, a vitrified brick surface, because it affords the best traffic surface, smooth, yet anti-skid, and because its fire-hardened toughness sturdily resists wear and tear and holds upkeep expense to a minimum. Any margin of slightly higher first-cost is speedily offset by lower maintenance and longer life.

Fourth, asphalt for filler, because asphalt between the brick seals the surface against water from above, and provides the elasticity required to forestall cracking and subsequent deterioration to which rigid pavements are susceptible, due to temperature and moisture stresses.

The sum of these four items is a pavement flexible enough to accommodate itself to natural forces, with a surface hard, tough, smooth and dense enough to resist the wear, tear and impact of intensive modern traffic.

Further data and specific figures on cost and performance on request.

also for surface treatment of roads and for grade crossings. It is composed of water, asphalt and a filler. It is shipped in wooden barrels and can be stored safely and kept indefinitely if water is applied occasionally. No heat is required for using it and it can be applied to wet stone or gravel and does not require skilled labor.

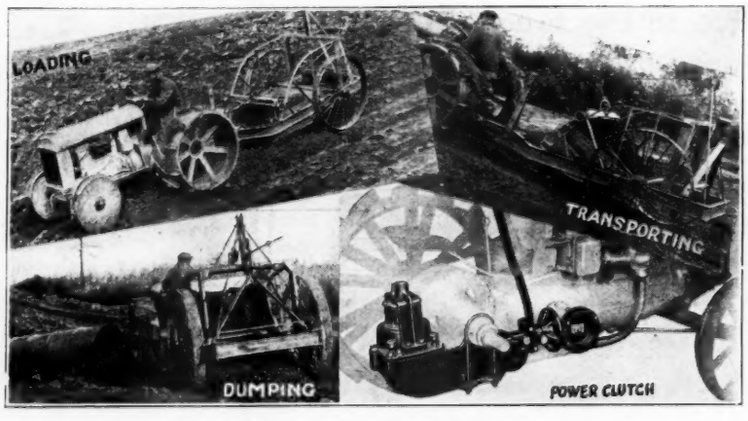
For general patching it is recommended that aggregate composed of three parts of 3/4-inch stone to one part of sand be used, and six parts of this be mixed with one part of ak-wa-felt, sufficient water being added to the last to bring it to a liquid condition so as to mix thoroughly with the aggregate. It can be used in making asphaltic concrete by mixing one part of ak-wa-felt to six parts of aggregate consisting of 1-inch to 1/4-inch stone and sand of the proper grading. The same proportion, with varying sizes of aggregate, is used for the various purposes mentioned above. If mixed with 30 to 40 per cent. of water and thoroughly stirred, it can be used by a distributor for surface treatment, using one-quarter of a gallon per square yard.

MIAMI FORDSON SCRAPER

After testing it out for a year the Miami Trailer Co., of Troy, Ohio, is prepared to start quantity production of a one-man power scraper designed exclusively for Fordson tractors. A power winch bolts onto the rear axle housing with 4 stud bolts and clamps onto the rear axle of the tractor by means of a U-bolt. This cast steel winch operates a revolving drum which by means of a 3/8 in. cable, elevates the scoop to any desired position, power being taken from the belt pulley arm of the tractor by a friction clutch.

The bottom of the scoop remains almost horizontal until it is loaded, when the operator pushes forward the control lever, which causes the winch and cable to raise the front of the pan to an angle of about 15 degrees, the bottom of the pan then being about 9 inches from the ground. It is held in this position while the tractor carries it, at a speed of 2 to 6 miles per hour, to the dumping point. (The pan holds 18 to 21 cu. ft. without spilling). Here he pushes the lever further forward and the dirt spills out the rear of the pan. Returning to the loading point, the operator pulls the lever back and returns the pan to the loading position. If a stone or other solid obstruction is struck, the operator raises the pan slightly and goes over it, without emptying the pan or stalling the unit.

The scraper is built entirely of steel, well reinforced. In three minutes the tractor can be disconnected to be used for other purposes; the power winch may be left on it permanently.



MIAMI FORDSON SCRAPER

INDUSTRIAL NOTES

DIRECT OXIDATION CORPORATION

The Direct Oxidation Disposal Corporation has announced that H. Jerome Hirst, formerly vice-president and general manager of that corporation, on November 30 severed his connection with it.

DU PONT WINS GRAND PRIZE

Announcement has just been made that the Brazilian International Centennial Exposition, recently held at Rio de Janeiro, has awarded the grand prize to E. I. du Pont de Nemours & Company for its exhibit of dynamite, caps and fuse in competition with products of the same type exhibited by other manufacturers.

PAWLING & HARNISCHFEGER CO.'s SOUTHERN OFFICES

The Pawling & Harnischfeger Co., of Milwaukee, Wis., has recently opened new offices in the South.

N. B. Norris, formerly district manager at New Orleans, is now district manager of the Memphis, Tenn., office. D. J. Murphy, formerly at the New Orleans office, is now district manager of the Texas district, with headquarters at Dallas, Tex. F. W. Truex will continue as district manager at Atlanta, Ga., with offices at 212 Haas-Howell Building.

W. J. Dugan, as Southern Sales Manager, will assume charge of the entire southern territory, with headquarters at Memphis.

For the convenience of P. & H. customers a complete stock of excavator renewal parts will be maintained at the Memphis office.

REDUCTION IN PRICE OF BELT CONVEYOR

The Link-Belt Co., of Philadelphia, announces that it has reduced the price of its "Cub" portable loader to $485. This is the machine that sold first for $700 and was then reduced to $585 and later to $550. These reductions have been made possible, the company states, by putting the manufacture on a production basis.

PAVING BRICK INDUSTRY

A sharp increase in unfilled orders for vitrified paving brick in December as reported to the United States Department of Commerce by the National Paving Brick Manufacturers Association may be taken as an indication of an active street and highway paving season for 1924.

Unfilled orders in December had jumped to 60,624,000 as against 54,535,000 for November and this is considered an accurate gauge of the demand for early spring and summer shipments. Stock on hand exceeds the total of unfilled orders. It is interesting to note, also, that contractors and engineers are assisting in relieving the seasonal aspect of the paving brick industry by asking for winter deliveries, shipments for December amounting to 12,979,000.

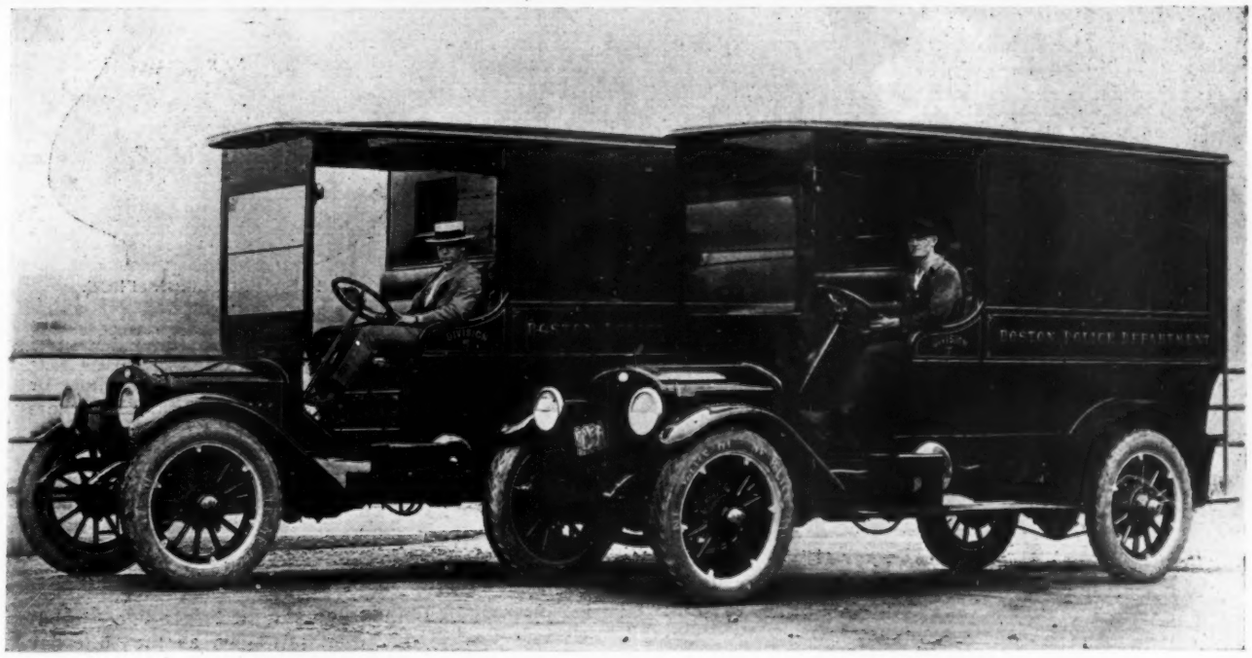
Kansas led in consumption for December, followed closely by Ohio. In the distribution of unfilled orders, Oklahoma leads the list, with Ohio, West Virginia, Pennsylvania and Illinois following in order.

BRICK PAVING IN THE WESTERN DISTRICT

The Western Paving Brick Manufacturers' Association informs us that prior to 1923 there had been laid in the territory covered by it 20,435,691 sq. yds. of vertical fiber brick, which was increased in 1923 by 2,999,222 sq. yds.

DORR COMPANY DIRECTOR

The Dorr Company announces that P. G. Paris, heretofore director of the Westport Mill (investigation and testing laboratory of the Dorr Co.) has resigned to return to the Bethlehem Steel Co., with whom he was formerly affiliated. He will be succeeded by J. A. Baker, formerly connected with the Dorr Co. as director of the Westport Mill from 1919 to 1922, when he was forced to resign by ill health. He has fully recovered and is now making a tour of inspection of the company's engineering activities prior to assuming his duties at Westport.



Dependable, Speedy, Economical

The reliability of GMC Trucks, their flexibility and the economy with which they can be operated and maintained recommend them particularly for civic institutional service and to public works departments. The two GMC one-ton models shown above belong to the Boston Police Department and are typical of many other similar equipments throughout the country. Sturdy beyond official capacity needs, speedy on good roads and remarkably economical GMC trucks are finding rapidly increasing favor everywhere.

The full story of GMC Trucks, complete detailed description of their exclusive features and an explanation of the way these add to GMC earning power and cut operating cost are given in the illustrated booklet, "Seven Steps Ahead." A copy of this booklet is ready to mail to you. Fill in the coupon below. Send it in today and your booklet will be forwarded by return mail.

GENERAL MOTORS TRUCK COMPANY
Division of General Motors Corporation
Pontiac, Michigan

GMC

General Motors Trucks

Mail This Today

GENERAL MOTORS TRUCK COMPANY,
Dept. 20, Pontiac, Michigan.

Please send me literature on GMC trucks, including your booklets, "Seven Steps Ahead."

Name .....
Business .....
Address .....
City ..... State .....

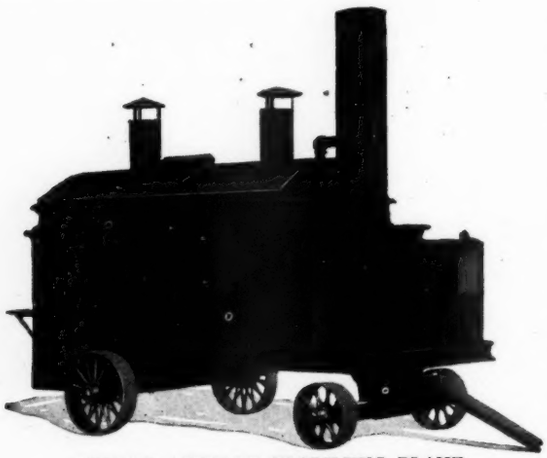
"G M C trucks are seven steps ahead"

PULLAR ASPHALT PRODUCING PLANT

Littleford Bros., of Cincinnati, Ohio, are now offering to contractors and highway and other municipal officials a small, portable asphalt producing plant, the invention of H. B. Pullar of the Indian Refining Co., which is claimed to be capable of making any kind of bituminous product from not more than two different grades of flux oil (liquid asphalt), or the combination of flux oil and natural asphalt. It will make asphalt for penetration work or filler for brick and block pavements, and A. C. for asphalt concrete and sheet asphalt.

Low penetration asphalt is necessarily shipped in drums or other packages, more inconvenient and costly than tank car shipping and storing, which are possible for flux oil. From a single grade of flux oil, kept on hand in tanks, a contractor can make any grades needed for all kinds of work.

In using this plant, about 1,250 gallons of flux oil is placed in the tank and the fire started. When the material reaches 350 degrees the blower is started and firing continued until 425 degrees is reached. The fire is then drawn and the blower allowed to run, the air causing a chemical reaction that increases the temperature to 480 or 500 degrees. After about two hours of blowing the material is suitable for penetration work; after three hours, for asphaltic concrete; four hours for sheet asphalt and five hours for brick filling. The capacity is 5 to 15 tons a day.



PULLAR ASPHALT PRODUCING PLANT
Front end, showing optional gasoline engine drive.

The plant is made entirely of plate steel, rigidly reinforced. The large fire box has a fire tile lining and two 12 x 16 in. doors. A recording thermometer is located above the fire doors; it can be detached easily when the plant is moved. On a platform at the front end are mounted a rotary blower and a 5 h.p. electric motor or gasoline engine, connected by a silent chain. Hoods protect the motor and chain drive from dirt and weather. The plant is mounted on heavy steel wheels. The total length is 15 ft., width, 8 ft. 6 in., height (including stack) 13 ft. 10 in., weight, 8,600 lbs. The shell is made of ¼ in. and 3/16 in. materials, the kettle of ¼ and ⅜ in.

FORD GENERAL UTILITY TRUCK

With a view to furnishing a low-cost, general utility truck, the Ford Motor Company is this year offering an all steel combination truck body and cab mounted on the standard Ford one-ton chassis.

The new body is of the open express type, so constructed that it may be readily converted into other body combinations by using stakes, side boards, canopy top, screen sides etc. It is built of steel to withstand the most severe usage. The steel sills are reinforced with wood in order to lessen vibration and road shocks, thus making for more durability and longer life.

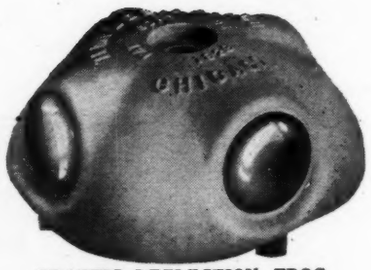
The loading space is seven feet two inches in length by four feet in width and of convenient and practical depth. The end gate is strongly braced and secured by heavy chains which hold it in position when lowered.

The cab, also of steel construction, is extra roomy. The seat is of artificial leather, well cushioned on four-inch springs. Protection from the weather is afforded by close-fitting curtains mounted on uprights and opening and closing with the door. An oblong window in the back of the cab gives ample facilities for rear vision.

The new truck, which is already on display in many Ford dealers' show rooms throughout the country, sells complete with steel cab body for $490 F. O. B. Detroit.

THE TRAFFIC REFLECTION FROG

The Temple Signal Company of Chicago, Illinois manufactures a traffic signal which it calls a "reflection frog," the word "frog" presumably because of its general appearance, as shown in the illustration. The frog is made of cast-iron 18 inches in diameter and 6 inches high and weighing about 125 pounds. Four lights are provided, each fitted with a ruby lens in front of a concave mirror. The light from an approaching automobile, passing through the ruby lens, is reflected back by the concave mirror in a concentrated bright red flash. The frog is provided in the top with a 1½-inch hole for receiving a semaphore or sign standard, for additional anchorage or decoration. The frog is provided with four 1½ x 1½-inch legs which are inserted in the pavement. They are claimed to be indestructible and requiring no expense of maintenance except an occasional coat of paint. The lenses are provided in red, green, orange or purple glass.



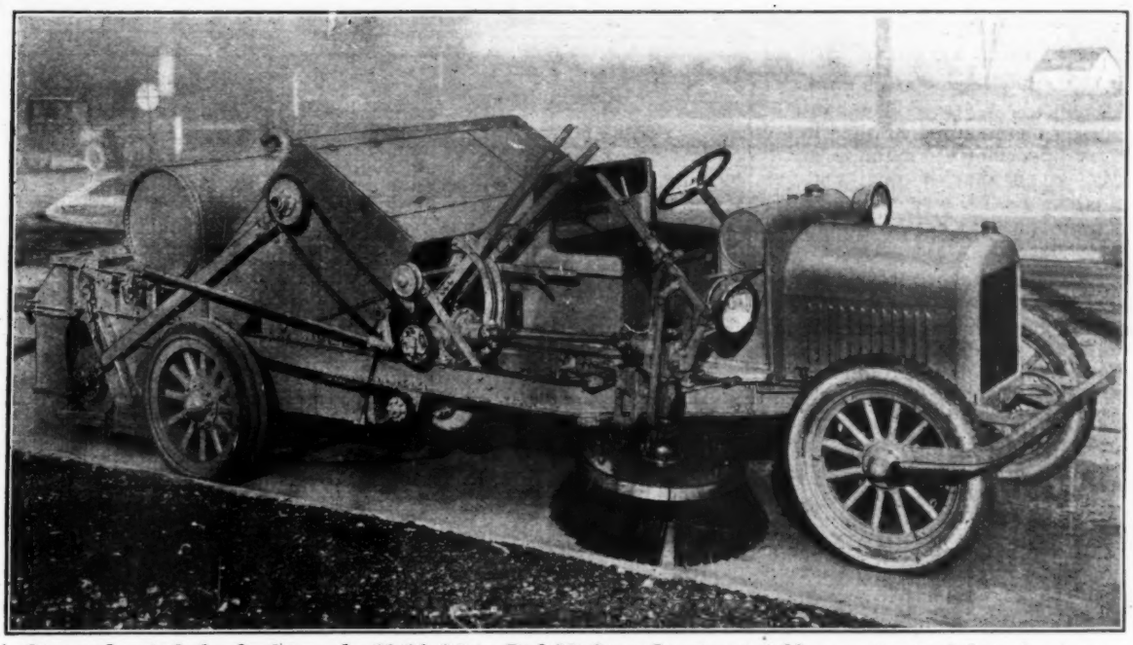
TRAFFIC REFLECTION FROG.

Instead of the silver glass "confused" lens, what is known as the "niterday signal" may be subsituted. This signal consists of a pipe standard carrying an aluminum sign with the lettering white on a black background and a border framed in red, and in addition a lens and 8-inch mirror which reflect the light of the automobile at night.

TITAN SUBGRADE TRUCK

The Titan Truck Company of Milwaukee manufactures a 2-batch and 3-batch subgrade truck, the features of which are a counter-balanced truck engine for a speed of 20 to 25 miles per hour, double reduction rear axle guaranteed for two years, mechanical hoist giving a 60-degree to 70-degree dumping angle, and a light weight giving only 550 pounds pressure per inch of tire width on the grade.

This truck is especially recommended for hauling materials over the subgrade to the mixer. It has a carrying capacity of three 5-bag batches or 9900 pounds on fair to good grades, or two batches on extremely poor grades. The entire chassis is designed especially for subgrade work. Although having such large carrying capacity, the chassis weighs but 6500 pounds, or 8400 pounds with body and hoist. It is claimed that by use of alloy steels, aluminum housings, etc., a saving is made of 700 pounds in the axle, 200 to 400 pounds in the hoist, etc. Forty-inch wheels are used to meet subgrade conditions, giving greater traction, wheel leverage in holes, and a road clearance of 13½ inches under the rear axle. The body is 9 feet 2 inches by 5 feet 6 inches, divided into two or three compartments by removable compartment gates. The tailgate is double-acting. The engine is a 45-horsepower Buda counter-balanced coach type.



Operated entirely by the driver, the Childs Motor Pick-Up Street Sweeper *sprinkles, sweeps up, and carries away all dirt and litter. The result—streets that progressive citizens can be* proud *of.*

Now—a machine that offers every city the boon of clean streets

with the economy of one-man control

STREETS free from litter and dust—streets to take pride in. The prosperous, up-to-date appearance that pleases the taxpayer and impresses the visitor—

You can easily have such municipal neatness now. And the cost is actually below the cost of maintaining out-of-date, slow methods.

With one man completely controlling it, the *Childs* Motor Pick-Up Street Sweeper gathers in every particle of dirt and rubbish. Its revolving gutter broom *follows the curb automatically,* throwing all litter under the wide pick-up broom. A clean, dustless sweep over every inch of the road.

No blocking traffic, either. This sweeper easily passes street cars, and it is flexible—readily manoeuvered.

It works rapidly, quietly. Lays dust by sprinkling and then takes it into a capacious hopper.

The improved conveyor will not choke or clog. All mechanical parts are readily accessible.

Its carefully planned width allows the Childs *Sweeper to pass street cars without interference.*

Altogether a business-like, economical equipment—bringing welcome cleanliness to many cities which formerly found street-cleaning a costly, vexatious problem.

Made by the same company that has produced other *Childs* Motorized Equipment now used in over 300 municipalities, the *Childs* Motor Pick-Up Street Sweeper carries a guarantee of sound engineering skill in every detail.

Write for complete specifications. On request, a Foamite-Childs representative from one of our nearby offices will call and confer with you.

Foamite-Childs Corporation

Engineers and Manufacturers

909 Turner Street, Utica, N. Y.

Foamite-Childs of Canada, Ltd., Toronto, Ont.

Sales and Engineering Representatives in the leading cities of all countries

"CLEAN STREETS ARE AN ASSET TO A CITY"

HELTZEL ROAD FINISHER

During 1923, the Heltzel Steel Form & Iron Company, Warren, Ohio, improved their concrete road finisher in several very important ways, the most noteworthy being that it now may be used either by its own power or by hand power in case engine trouble should ever develop.

The machine averages in weight with other machines on the market, yet little effort is required to operate it by hand when necessary, two men being required in such case, and one when the engine is used.

The machine has several speeds forward and backward. The strike-off is raised by eccentrics, and also has a lateral motion from 4 in. to 8 in.

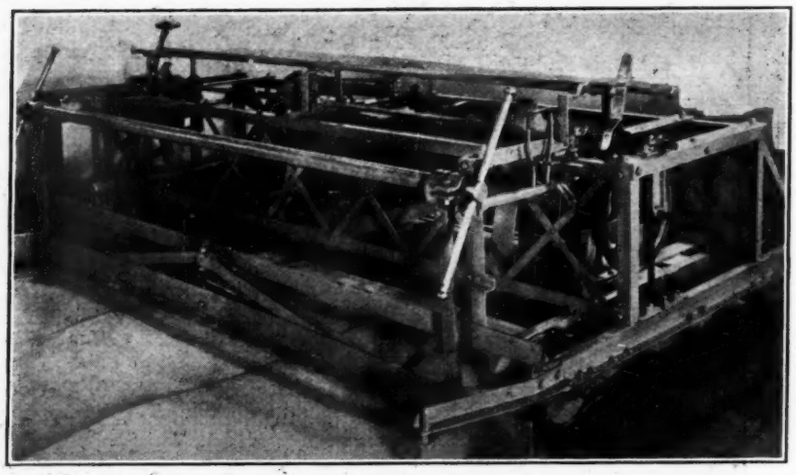
The blades work from a pivot attached underneath the eccentric straps and thus travel on an arc, compression being about ⅛ in. to 3/16 in. (more or less may be had by changing stroke).

The finisher is provided with tamp and belt as well as the strike-off above mentioned, any one of which may be either operated or idled as desired. All the controls are on each side of finisher. In going around curves, either side of finisher can be thrown out of gear.

As early as two years ago The Heltzel Steel Form & Iron Company built a special finisher for this kind of work for New York State—a 16 ft. road in two slabs.

All Heltzel Finishers as now built, have these features incorporated.

When transporting the Heltzel Finisher from car, all that is necessary is to run off the car on its own wheels, which are provided for transportation purposes. These wheels are taken on or off at will, as it is not necessary to dismantle any part of the machine.



HELTZEL ROAD FINISHER.

No little trouble has been caused by finishing machines running off the forms. Means are now provided whereby this is practically impossible, when the Heltzel is used.

JOHNSON TRACKPULL

The A. C. Johnson Products Co., of Racine, Wis., manufactures a crawler track to be used with a Fordson tractor that it calls the "trackpull." It is claimed to double the draw bar pull of the tractor. Each track section consists of two links, two pins, a shoe and a grouser. The links are interchangeable, case hardened drop forgings. The shoe is of high carbon steel, equipped with angle iron grousers in the shape of a crescent. The track has 50 in. length on the ground, shoes 10 in. wide. The height of track is 39 in. The track rollers and all bearings are dust proof. It turns within its own length with no loss of power.

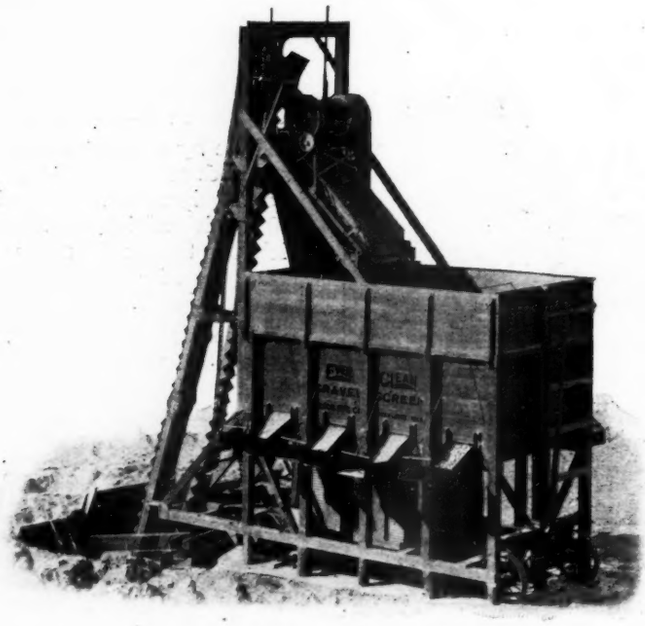
"JUMBO" GRAVEL SCREEN

The Beach Manufacturing Co., of Charlotte, Mich., claims to furnish "everything used in, on or under highways," including wheel, drag and Fresno scrapers, plows, drags, road graders and maintainers, corrugated culverts, concrete mixers, road signs, tamper rollers and steel bridges.

Its latest product is the "Jumbo Everclean" gravel screen. This is a portable screen with an elevating capacity of 60 cu. yds. an hour and storage capacity of 40 tons. The frame is formed of 6x6 timbers, put together with steel framing angles and bolts—no nails, spikes or tenons are used. It is mounted on trucks with a carrying capacity of 15 tons.

The elevator delivers the gravel to a friction driven, revolving drum which rejects the oversize stones to a spoil pile or crusher, while the remainder passes onto a slowly revolving screening table, where the sand is removed and falls into a sand bin, the gravel passing over the screen into a gravel bin. The screening table is built up of perforated plates attached to endless chains and overlapping each other, making a constantly moving screen nine feet long by three feet wide. The plates move upward, while the gravel moves downward by gravity, and carry over the upper end any material too sticky to pass through the plates; then turning completely upside down and striking forcibly against a spring bumper, they free themselves of any material inclined to stick to them.

Power is furnished by a 9 h. p. gasoline engine located in a water-tight engine room, the roof of which is formed by the steel-lined bottoms of the bins.



JUMBO "EVERCLEAN" GRAVEL SCREEN.

NEWS OF THE SOCIETIES

CALENDAR

April 7-10—NATIONAL CONFERENCE ON CITY PLANNING. Annual conference at Los Angeles, Cal.

April 9-12—AMERICAN SOCIETY OF CIVIL ENGINEERS. Spring meeting at Atlanta, Ga.

April 15-17—SOUTHEASTERN WATER AND LIGHT ASSOCIATION. Annual convention at Atlanta, Ga. Secretary, W. F. Stieglitz, Columbia, S. C.

April 16-18 — TEXAS SECTION, AMERICAN SOCIETY C. E. Annual meeting at Brownsville, Texas.

May 12-14—AMERICAN ASSOCIATION OF ENGINEERS. Annual meeting at San Francisco, Cal.

May 13-15—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting at Chalfonte-Haddon Hall, Atlantic City, N. J.

May 19-23—AMERICAN WATER WORKS ASSOCIATION. Annual convention at Hotel Astor, New York City. Secretary, J. M. Diven, 153 West 71st Street, New York.

June 23-28—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting at Chalfonte-Haddon Hall, Atlantic City, N. J.

Sept. 23-26—NEW ENGLAND WATER WORKS ASSOCIATION. Annual convention at Powers Hotel, Rochester, N. Y. Secretary, Frank J. Gifford, Boston, Mass.

AMERICAN ENGINEERING COUNCIL

A new constitution of what was formerly known as the Federated American Engineering Societies provides for a radical revision, one feature of which is the dropping of the above name and replacing it by "American Engineering Council," which now stands for the association of societies. The administrative and legislative body, formerly called the "American Engineering Council," is now designated the "Assembly," the name of the executive board is changed to "Administrative Board," and that of the Committee on Procedure to the "Executive Committee."

NATIONAL FIRE PROTECTION ASSOCIATION

The 28th annual meeting of the National Fire Protection Association will be held at Atlantic City May 13th, 14th and 15th. Headquarters will be at the Hotel Chalfonte-Haddon Hall, the sessions being held in the latter building.

ILLINOIS SECTION, AMERICAN WATERWORKS ASSOCIATION

The sixteenth annual meeting of this section will be held at the University of Illinois, Urbana, Illinois, on March 19th and 20th. G. C. Habermeyer, engineer of the Illinois State Water Survey, is secretary of the section.

NEW ENGLAND WATER WORKS ASSOCIATION

At the February meeting of this association Charles P. Pool read a paper entitled "Random Notes on Sanitation in New Hampshire," and H. W. Clark one on "Further Studies of Water Purification by Filters Charged with Aluminum or Ferric Hydroxide." Following these papers and discussions of them, there was an active discussion of the subject "Why the Applicant Should Pay the Actual Cost of Service Installation from Street Main to Meter." It appeared from this that in most cities the cost from main to curb is paid by the water works, but there was general agreement that the water department should lay the entire service and pay for it as a capital cost of the system.

WISCONSIN SOCIETY OF ENGINEERS

The sixteenth annual convention of this society met at Madison, February 21, 22 and 23, with an attendance at the meetings of nearly 100. Among the papers read were "Super-power vs. Coal Conservation," by Egbert Douglas; and "Improved Vibrolithic Concrete Pavement," by S. J. Miller; both of which were freely discussed. Robert Isham Randolph described the effect upon the water level of the Great Lakes of the amount withdrawn into the Chicago canal. A committee on Sewerage told of the development of the 206 sewerage systems and 74 sewage treatment plants of the state.

The officers elected for the coming year are: W. G. Kirchoffer, president; A. L. Hillis, vice-president. Leonard S. Smith, secretary-treasurer; M. W. Torkelson, trustee.

NEW YORK STATE ROAD BUILDERS ASSOCIATION

The annual banquet of this association was held at Hampton Hotel, Albany, on February 5th. About 250 contractors and guests were present. The principal speakers were Col. Frederick S. Greene, state commissioner of public works; Senator James J. Walker; H. H. Wilson, vice-president of Zone No. 2 of the Associated General Contractors, and Benjamin P. Wheat, counsel of the association.

INDIANA ENGINEERING SOCIETY

The forty-fourth annual meeting of this society was held at Indianapolis on February 14 and 15. Meetings were held jointly with the American Association of Engineers, and with local chapters of the A. I. E. E., the A. S. M. E., the S. A. E., and the Scientech Club. The officers elected for the coming year were: E. R. McCullough, president; Geo. W. Hubley, vice-president; F. C. Atkinson and H. M. Anthony, trustees.

The secretary reported that the membership had increased 80 per cent, being then 343, and that the finances were in a healthy condition.

Among the subjects discussed were garbage disposal, illumination of roads, working of the engineers' registration law (in operation since 1921), and the function of the technical school. A resolution was adopted endorsing the idea of a Federal department of public works.

MINNESOTA FEDERATION OF ARCHITECTURAL AND ENGINEERING SOCIETIES

The annual meeting was held on February 1 and 2 at Duluth. Among the matters discussed were the Great Lakes-St. Lawrence tidewater project, the relation of rainfall to drainage in the state, the development of peat and lignite resources and of low-grade iron ore, and the selection of professional engineering consultants by municipalities.

The officers elected for the coming year were: Max Toltz, president; Edwin H. Brown, 1st vice-president; J. R. Stack, 2nd vice-president; G. H. Hutchinson, treasurer. Katherine A. Feucht was continued by the board as executive secretary.

OHIO ENGINEERING SOCIETY

The annual convention of this society was held on February 7 and 8 at Columbus. Among the 250 in attendance were engineers, county surveyors, county commissioners and contractors, and most of the time was taken up with discussion of highway matters, with one session devoted to city engineering. J. R. Binkey described the reinforced concrete viaduct 1,317 feet long on the Chicago-Buffalo road, of which he is engineer in charge. E. W. James discussed tendencies in concrete pavement design, and Col. H. C. Boyden described the Abrams water-cement ratio method of mixing concrete. Highway problems were discussed by Geo. F. Schlesinger, H. J. Kirk, A. W. Zesiger, A. Stellhorn, H. S. Perry and R. H. Smith.

The officers elected for the coming year were: E. A. Lawrence, president. Geo. F. Schlesinger, vice-president; John Graham, secretary-treasurer.

MICHIGAN ENGINEERING SOCIETY

The convention of this society, the State Division of the American Association of Engineers, was held at Port Huron, February 5, 6 and 7, with approximately 150 engineers in attendance. Harry A. Shuptrine was elected president.

Clifford Older described the results of the Bates Road tests. J. M. Bennett discussed roadside shrubbery and maintenance. Roderick B. Young described the method of the Ontario Hydro-Electric Power Commission in controlling quality of concrete. W. C. Hoad discussed sew-

age treatment by small communities. Geo. H. Fenkel and C. W. Hubbell explained the water supply problem of the district extending for 100 miles along the Detroit river, Lake St. Clair and the St. Clair river. Gardner S. Williams spoke on the present status of the Great Lakes-St. Lawrence waterway.

PORTLAND CEMENT ASSOCIATION

The Portland Cement Association announces the opening of a district office in the First National Bank Building, Oklahoma City, with B. E. Clark as district engineer. Forest Kaufman will be district manager of the Kansas City and Oklahoma districts, the former comprising Nebraska, Kansas and Western Missouri. Mr. Clark is a graduate civil engineer, who was division engineer of the Oklahoma State Highway Department in 1920 and served as state highway engineer of that state from February to May, 1921, when he was appointed state highway commissioner. He joined the staff of the Portland Cement Association in November, 1922.

PERSONALS

Gorman, A. E., sanitary engineer for the U. S. Public Health Service, has been appointed sanitary engineer to the Chicago Department of Health.

Harrison, F. Earle, recently first assistant city engineer of Schenectady, N. Y., has been promoted to deputy city engineer.

Moss, Earle B., formerly appraiser for the Bureau of Assessment and Taxation of Niagara Falls, has been appointed city engineer of that city.

Wentworth, John P., for thirteen years in the employ of Metcalf & Eddy, of Boston, has been admitted to that firm as a junior partner.

Hawley, Maj. John B., of Fort Worth, Tex., and H. N. Roberts, of Lubbock, have founded a firm under the name Hawley & Roberts.

Fassett, Earle W., has been appointed city engineer of Casper, Wyo.

Mack, John G. D., state engineer of Wisconsin, died of heart disease on March 2.

Flinn, William, of the firm of Booth & Flinn, contractors, died Feb. 19, of pneumonia.

Carpenter, J. C., formerly senior highway engineer, Bureau of Public Roads, has been appointed assistant district engineer for the Bureau, with his office at Fort Worth, Tex.

Neeson, John H., has been reappointed chief engineer of the Bureau of Highways of Philadelphia, Pa.

Norcross, Paul H., consulting engineer of Atlanta, has been elected president of the Chamber of Commerce of that city.

Buchholz, G. W., formerly executive secretary of the Associated General Contractors of America, has organized the Buchholz Construction Co., with office at Asheville, N. C.

Laverty, Francis J., formerly engineer with the Sanitary District of Chicago, has been appointed assistant engineer with the Division of Sanitary Engineering of the West Virginia State Department of Health.

Biles, George H., has been appointed director of the Department of Public Works of Philadelphia.

Murdock, Alexander, formerly city engineer of Chicago, has been appointed chief of the Bureau of Water of Philadelphia.

Winslow, Frederic I., treasurer of the New England Water Works Association and engineer with the Water Division of the Boston Metropolitan District Commission, died recently.

Brondson, Milton H., recently city engineer and deputy commissioner of public works of Providence, R. I., became commissioner of public works of that city on March 1.

RECENT PUBLICATIONS

SURVEYING

The fifth Edition of Volume 1 of "Breed & Hosmer's Elementary Surveying" has just been published by John Wiley & Sons. This edition contains 593pages, 5x7½, with 223 cuts. The authors are a professor and associate professor in the Massachusetts Institute of Technology. This book has been perhaps the leading textbook on surveying for a number of years. In the new edition the chapter on "Astronomical Observation" has been improved, while that on "City Surveying" has been substantially rewritten.

"OPERATION AND CARE OF SEWAGE TREATMENT PLANTS"

This pamphlet of 38 pages, 6x9, was written by Stanley Pinel and published by the Engineering Extension Department of Iowa State College. In popular language, it explains the methods of sewage treatment employed in Iowa, both their construction and operation, and gives instructions for the proper care of each kind of plant. It does not go into many technical details, but should be an excellent treatise for the general information of the layman and also makes many valuable suggestions for the operators of such plants.

RESEARCH NARRATIVES

In January, 1921, Engineering Foundation, of New York, began printing twice a month little leaflets entitled Research Narratives. Each contained a five-minute story of research, invention or discovery. The stories, or the materials for them, were contributed by scientists and engineers of international reputation.

The purposes were to broaden general intelligence about research in science and engineering and to increase interest. Means at disposal of the Foundation permitted mailing the Narratives only to a limited list. The editions were soon exhausted; numerous requests for back numbers could not be satisfied. Suggestions came to the Foundation that the Narratives should be collected into a book and reissued.

Believing that these Narratives would be interesting and useful to thousands of persons who have not known about them, Engineering Foundation is having the first fifty made into a small, well-bound book and offering it at fifty cents a copy.

The Narratives cover a wide range of subjects. A few titles will be suggestive: The Story of Mendelism; Electric Welding; Nitrogen, Its Capture and Utilization; Whittling Iron; A Serbian Herdsman's Contribution to Telephony; The Birth of Bakelite; The Upper Critical Score. Most of the Narratives are readable by students in the last years of good secondary schools as well as by their elders in business, industry, engineering, teaching and other vocations.

CIVIL SERVICE EXAMINATIONS

Engineering Aid. U. S. Civil Service Commission, on March 26. In the Lighthouse Service. Salary $1,740. Requirement, two years' experience, or study in a technical school, of civil, mechanical, or marine engineering.

Hydrographic and topographic draftsman. U. S. Civil Service Commission, until April 1. In the Coast and Geodetic Survey. Salary $1,640. Requirement, two years' study in an engineering course or three years in a college course with mathematics, physics and surveying.

Computer. U. S. Civil Service Commission, on April 9 and 10. In the Coast and Geodetic Survey. Salary $1,640 in Washington, or $3,000 in Manila. Requirement, examination in mathematics, astronomy, physics, surveying; practical computations; French, Italian, Spanish or German.

Construction draftsman (engineering). U. S. Civil Service Commission, until April 15. In office of Supervising Engineer, Indian Irrigation Service, Los Angeles. Salary $1,740. Requirement, four years of either progressive engineering experience (including at least one of drafting), or study in an engineering course.

Topographic Aid. U. S. Civil Service Commission, until June 30. In the Geological Survey. Salary, $95 to $170 a month and traveling expenses. Requirement, completion of first semester of junior year in a civil engineering course; or two years of such course and five months' experience with level, transit or planetable; or equivalent education and experience.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

HOOSIER EXPANSION JOINT

The Hoosier Asphalt Co., of Alexandria, Ind., makes an expansion joint for roadways, sidewalks and other construction that secures a maximum of compressibility and resiliency by using pure asphalt not carrying any filler or other foreign material. In order to enable it to stand up when set in place, there are embedded in it at regular intervals thin, narrow wooden strips set vertically, which constitute 2 per cent. or less of the total bulk. As there is no metal, felt or other material on the face of the asphalt, it will adhere to the concrete as the joint opens in cold weather.

The asphalt used has a melting point between 234 and 250 deg. Fahr., 99.5 per cent. soluble in carbon bisulphide, 21 to 23 penetration at 32 deg., 30 to 33 at 77 deg., and 42 to 46 at 115 deg.

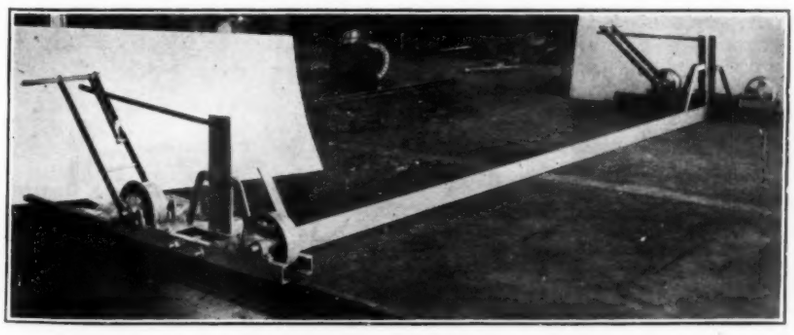
HELTZEL SUB-GRADER AND STRIKE-OFF

The Heltzel Steel Form & Iron Company, Warren, Ohio, is now ready to place on the market an automatic sub-grader and strike-off. It is called "automatic" because by pressing slightly on a lever, the strike-off proper rises a sufficient height to clear the sub-grade or material struck off or graded, while machine is being reversed.

The end heads run either on forms, curb or gutter as required. When using the machine on curb or gutter, the wheels may be reversed so that flange will operate on the inside.

The machine weighs about 1,000 pounds, yet will do grading equally as well as the heavy sub-grading machines. The cross member is crowned to specifications, and the grader blades are attached on an arc conforming to this crown. When reversing, a slight pressure on the handles raises the strike-off clear of any material and it can be locked instantly in any position from top of forms to as much as 10 inches below, if required.

These machines are manufactured from 4-foot for sidewalk work, to 40-foot for road and street work.

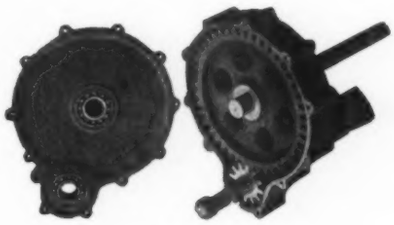


HELTZEL SUBGRADER.

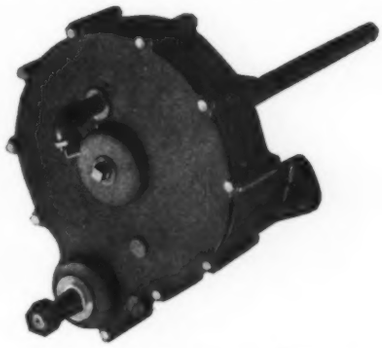
ETNYRE ROAD OILERS

The 1924 Model F oil, tar and asphalt distributor manufactured by E. D. Etnyre & Company of Oregon, Ill., will have as one of its special features driving gears of the enclosed type running in an oil bath. The rawhide pinions of the former models will be replaced with a steel pinion having twelve teeth and a 2-inch face. The gear on the pump shaft will be of cast-iron with forty-four teeth. The gears will be completely enclosed in an oil-tight and dustproof casing of the best cast iron which will consist of two parts, a base and cover. The base has two bracket arms, one on each side, cast integral with it by which it is bolted to the frame. The cover is bolted to the base with eleven bolts and an oil-tight joint secured by using an oil paper gasket. Bearing balls 7-16-inch diameter of a high-grade standard make are used. A ½-inch pipe connection with a plug is provided for supplying oil to the case, and the oil is retained in the housing and grit and dust are kept out by the use of pure wool felt gaskets inserted in grooves in the case where the shafts extend through it. Gears and bearings are lubricated by the splash system which operates as long as there is an inch of oil in the bottom of the case.

The several parts of the case are machined on jigs with such accuracy as to insure proper meshing of gears, alignment of shafts and interchangeability. The case can be readily installed on any of the Model F units which were originally furnished with open-type gears. The manufacturers claim a saving of about ten per cent in power in the new design and also much greater convenience in lubrication.



GEAR CASE OPEN.



DRIVING GEAR OF 1924 ETNYRE ROAD OILER.

JUMBO ROAD MACHINERY

Road machinery under the trade name of "Jumbo" is manufactured by N. S. Monroe & Sons of Arthur, Illinois, who designate it as the "Pioneer Planer Type."

The Jumbo Patrol is a 1-man machine with a spread of planers from 9 to 16 feet. The Jumbo Special is also operated by one man, although weighing nearly twice as much as the Jumbo Patrol and operated by a 30-60-horsepower oil tractor. It scrapes from 10 to 30 feet, the two scraper bars being each 25 feet long. The blades are reversible and are fitted to the bars in three sections, all of the same length and consequently interchangeable. The short length makes it easier to handle and sharpen and cheaper to replace than one long blade. The Jumbo Special is regularly equipped with a smoother in the rear.

The firm also makes steel road drags for small tractor trucks or horsepower, from the single straight-blade drag suitable for two or four horsepower to the Giant Mould Board Drag for four or six horses, or, if of 10-foot width, for a small plowing tractor or army truck.

THE HUBER MOTOR ROLLER

As an innovation in three-wheel motor roller design, the Huber Manufacturing Company of Marion, Ohio, has brought out a four cylinder model that differs from the conventional motor roller design in several important particulars.

The power plant consists of a four-cylinder, 50 h. p. heavy duty engine that the Huber Company has been using for several years in heavy tractor work. It provides a very flexible power plant that cranks as easily as a motor truck and runs with practically no vibration. Engine speed may be varied at will both with the throttle and with the automatic governor controlled from the deck. This is what is known as the loose bearing type engine, with full force feed oiling system that floats all bearings on a film of oil. The three-inch crank shaft is guaranteed for the life of the outfit and all other parts are oversize in proportion.

THE HUBER MOTOR ROLLER.

The transmission gears are made of high carbon, alloy steel, machine cut and hardened and run in oil bath. Hyatt and Timken roller bearings are used throughout. A spur gear differential that applies equal power to each drive wheel and greatly facilitates short turning is a part of regular equipment.

The two-speed transmission, with the variation that can be secured by manipulating the throttle or governor of the engine, provides a range of road speeds from less than one mile per hour to more than three miles per hour, both forward and reverse. The change from forward to reverse or vice versa is through oversize clutches controlled by a single lever and is accomplished without the necessity of shifting gears.

All working parts are mounted in a heavy frame made of boiler plate that extends in one unbroken piece, the entire length of the roller. The two sides are internally braced to make a rigid support for the engine and transmission parts. The whole is enclosed and protected from dust and weather with a sectional sheet metal hood, hinged to provide easy access.

Provision is made for attaching the standard Huber scarifier same as used for years on the Huber steam roller, except that on the motor roller it is air controlled.

This motor roller is claimed to be unusually economical as concerns fuel and oil consumption. Reports from some 20 different rollers working in various parts of the country under various conditions show an average consumption of approximately 15 gallons of gas, a quart of oil and a quart of water in a 10 hour day. The longest time reported for starting motor when cold was five minutes.

The Huber Company has equipped its shop to enable it to turn these rollers out in large numbers. A catalog in colors giving details of construction and complete specifications can be secured by addressing the company.

JARMIN ROAD FIXER

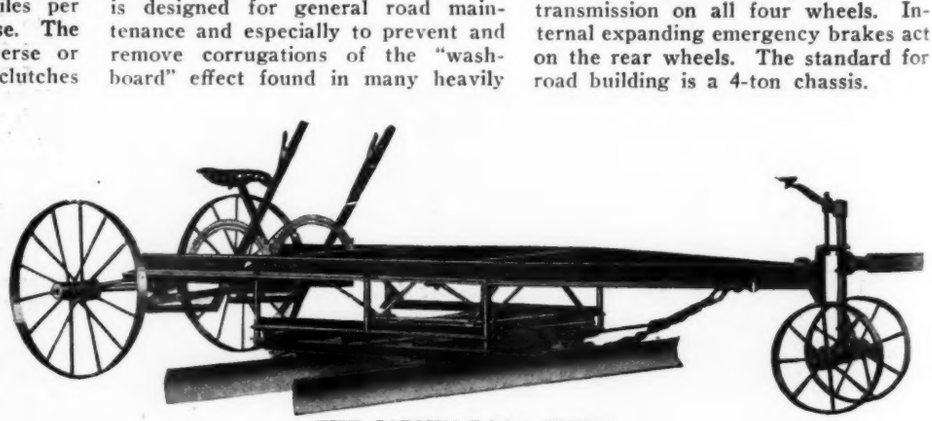
The Glide Road Machine Company of Minneapolis, is putting out a new type of road machine known as the "Jarmin Road Fixer." This machine is designed with the idea of utilizing its full weight to hold the blades to their work, believing that a light machine so constructed is more effective than a heavier one where much of the weight is carried on the wheels.

The machine is operated by one man and can be hauled by from two to four horses or a small tractor or truck. It is designed for general road maintenance and especially to prevent and remove corrugations of the "washboard" effect found in many heavily traveled roads. This is accomplished by providing a wheel base 156 inches long and two 8-foot curved blades which are hung under the main frame by means of a rigid sub-frame or blade carrying device which prevents chattering of the blades. The rear wheels are on separate bell-crank axles controlled by separate levers, and the machine is raised or lowered on these or tilted to fit the crown of the road.

The two blades steady each other and the entire weight of the machine and driver is available to hold them to their work; while, as they cannot drop into low spots, the high points are cut off and the low places filled.

The blades may be turned to cut either way and are always parallel and always track. A vertical adjustment at the front of the machine controls the proportional cut of the two blades so that they can be set either so that both cut equally or so that the front blade may do all the cutting and the rear blade smooth and pack the dirt and remove stones.

The machine weighs about 1100 pounds. It may be had with either hand wheel and worm gear lift or with lever lift.



THE JARMIN ROAD FIXER

OSHKOSH 4-WHEEL DRIVE TRUCK

The Oshkosh Motor Truck Mfg. Co. of Oshkosh, Wis., manufactures a 4-wheel drive truck for which it claims sturdiness, power and simplicity of design. The entire front end load is carried on roller bearings, minimizing frictional resistance in turning the truck.

The motor is a 4-cylinder, cast in pairs, delivering 56 brake horsepower at 1,200 r. p. m. The transmission is Fuller four speed. The drive consists of a short propeller shaft with two universal joints to center transmission, which has automatic locking equalizer conveying power to front and rear axles through propeller shafts of equal length. The axles are one-piece cast steel full floating both front and rear, embodying that company's patented driving and steering mechanism in the front axle. The service brakes are external contracting, acting through subtransmission on all four wheels. Internal expanding emergency brakes act on the rear wheels. The standard for road building is a 4-ton chassis.

NEW CATALOGS

(If you want any of these catalogs send the number with your name and address to PUBLIC WORKS and it will be sent to you promptly without charge or obligation.)

T. A. GILLESPIE COMPANY

690. The T. A. Gillespie Company, engineers and contractors of New York City, have issued a book of illustrations, with brief descriptions, of work performed by the company during a period of thirty-three years. 106 pages, 10½ x 8.

MATHESON JOINT

691. The National Tube Company of Pittsburgh, Pennsylvania, has published a new catalogue describing uses and advantages of National Matheson Joint Pipe, together with some useful hydraulic information. 64 pages, 8½ x 11.

ROAD MACHINERY

692. The Austin - Western Road Machinery Company, of Chicago, issues a catalogue entitled, "The Austin-Western Line," describing graders, scrapers, screens, rollers, scarifiers, etc. 64 pages, 9 x 12.

INDUSTRIAL GASOLINE ENGINES

693. The Wellman-Seaver-Morgan Company of Cleveland, Ohio, describes the W-S-M industrial engine for direct connection to locomotive cranes, power shovels, concrete mixers and other machinery. 24 pages, 8½ x 11.

DUMP BODIES

694. The Mandt Company of Keokuk, Iowa, describes automatic dump bodies with special designs for different purposes. 14 pages, 8½ x 11.

CONCRETE MIXERS

695. The Remmel Manufacturing Company of Kewaskum, Wisconsin, describes its chainless, beltless drive mixrite concrete mixer. 4 pages, 8½ x 11.

THE TRACKPULL

696. The A. C. Johnson Products Company of Racine, Wisconsin, describes the Johnson Trackpull, a crawler attachment for the Fordson tractor. 6 pages, 4 x 9.

THE POWERMAKER

697. The Cook Motor Company of Delaware, Ohio, describes the Denison powermaker, an internal combustion engine with novel features. 12 pages, 4 x 8½.

TRACTION EXCAVATOR

698. The Keystone Driller Company of Beaver Falls, Pennsylvania, describes the Keystone traction excavator Model 4 and its uses for street grading, trenching, etc. 4 pages, 8½ x 11.

HIGHWAY MOWER

699. The Rawls Machine & Manufacturing Works of Chicago, describes the Rawls highway mower for mowing grass and weeds along the sides of highways. 4 pages, 8½ x 11.

Marshaling the Telephone Forces

In the simple act of lifting the telephone receiver from its hook every subscriber becomes the marshal of an army. At his service, as he needs them, a quarter of a million men and women are organized in the Bell System. One skilled corps of the telephone army moves to place him in talking connection with his neighbor in the next block, in the next state or across the continent. Another highly trained corps is on duty to keep the wires in condition to vibrate with his words. Still others are developing better apparatus and methods, manufacturing and adding new equipment, and installing new telephones to increase the subscriber's realm of command.

The terrain of the telephone army is the whole United States, dotted with 14,000,000 instruments, all within range of the subscriber's telephone voice. Even in the remote places this army provides equipment and supplies. Its methods of operation are constantly being improved, that each user may talk to his friends with increased efficiency. Millions of money are spent in its permanent works. Yet its costs of operation are studiously held to the minimum, that the subscriber may continue to receive the cheapest as well as the best telephone service in the world.

The permanent objective of the Bell System army is to meet the telephone needs of the nation—a hopeless task were not its command unified, its equipment adequately maintained and its personnel trained in the latest developments of telephone art.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

CURING CONCRETE WITH CALCIUM CHLORIDE

700. The use of 3-C calcium chloride, amount required, results obtained, etc., published by the Calcium Chloride Company, Carbondale, Pa. 12 pages. 3½ x 6.

"DOMESTIC" HOISTS AND PUMPS

701. Describes plant for builders and contractors manufactured by Domestic Engine & Pump Company of Shippensburg, Pa. 4 pages. 8 x 10.

THE NATION'S ROAD MAKER

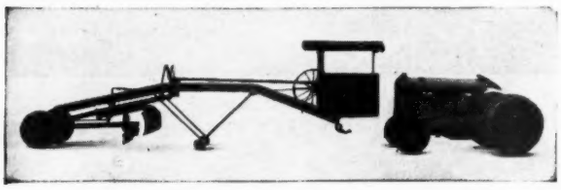
702. Folder describing the Holt Caterpillar manufactured by the Holt Manufacturing Company of Peoria, Ill. 12 pages. 4 x 9.

THE REDFLEX DANGER SIGNAL

703. The Automatic Signal & Sign Company of Chicago, Ill., under title of "The Warning Sentinel," describe the Redflex Highway Danger Signal for various locations and purposes. 16 pages. 4 x 9.

GILBERT ROAD MACHINE

The Gilbert Manufacturing Company of Aberdeen, S. D., has recently placed on the market a "Universal Road Machine" as a one-man controlled outfit with an unusually long wheel base of 16 feet, which is of special advantage in using it as a maintainer to take waves out of a road. The blade is located ahead of the power, which makes it a good bulldoser or hole-filler. The frame carrying the blade can be attached to the operating tractor in less than five minutes, and when removed the tractor can be used for other work.



GILBERT GRADING MACHINE WITH TRACTOR REMOVED.

The weight of the machine is 4,200 pounds, or 8,000 pounds when weighted for road building. The mouldboard can be furnished either 6 feet or 8 feet long, as desired. The machine has a four-wheel steering arrangement which is claimed as preventing skidding and giving greater bearing surface. Another advantage of having the blade ahead of the power is that it makes a successful snowplow.

RUSSELL CRUSHING AND SCREENING PLANT

The Russell Grader Manufacturing Co., of Minneapolis, Minn., last June first placed in the field a plant that screens, crushes and loads gravel, all in one operation, all being combined in one unit using only one power plant and readily moved from place to place. Gravel from the pit is screened, over-size material is crushed and screened, and all is then loaded into trucks, cars or bin; an auxiliary hopper holding enough screened material to fill a truck without waiting. It is claimed that it will deliver from 300 to 600 cu. yds. in a working day, depending on the amount of over-size material to be crushed.

The pit run of material is brought by drag line or scraper to the feeder conveyor which carries it to a shaking grizzly, which diverts over-size material to the crusher. Matter passing the crusher is again carried to the grizzly. The screened material is delivered by a 24-in. belt conveyor. The feeder conveyor may be omitted and a hopper substituted if the pit material is excavated by steam shovel, which can deliver it directly into the hopper.

The weight complete is 28,500 lbs.; horsepower required, 45 to 50. The crusher is 8 x 36, reducing to 3/4 in. in one operation. The feeder conveyor is a 24 in. belt on spool-shaped rollers carried by a steel frame; standard length 40 ft., but 10 ft. sections can be added. Grizzly, 30 x 120 in.; Delivery conveyor, 20 ft. or longer.

JACKSON PETROLEUM ENGINE

The Petroleum Motors Corporation, of Rockford, Ill., manufacture an internal combustion engine for truck engines that uses kerosene or distillate and is claimed to produce an almost even flow of power to the crankshaft. 8½ to 11 miles to a gallon of kerosene with 2½ and 3½-ton trucks in service is claimed.

These results were obtained by adding to a 4-cylinder, 4-cycle engine, an extra piston in each cylinder, the full power of the explosion in each cylinder being utilized both upward and downward. The extra piston is connected to the crankshaft by a long connecting rod set at 90 degrees behind the downward acting piston, thus securing an overlapping impulse.

The heads of both upper and lower pistons are concave, thus producing great turbulency which promotes complete combustion. Because both heads are hot, low grade fuel like kerosene is as efficient as gasolene would be in the usual type of engine with a single head. The fuel bills are claimed to be reduced not only by use of low cost fuel but also because of greater efficiency of the engine.

"MIXRITE" CONCRETE MIXERS

The Remmel "Mixrite" concrete mixer, manufactured by the Remmel Manufacturing Co. of Kewaskum, Wis., is described as a chainless, beltless drive and locking tilting mechanism. It is possible to lock the drum in any position with one inch variations. The mixers are available in sizes from 2 to 7 cubic feet capacity, and on skids or on trailer trucks with either steel or pneumatic tired wheels, and either with or without engine.

The drive engages the rack at the bottom of the mixing drum through a reducing train of gears connected directly to the engine crank shaft, less lost motion and friction being claimed for this as compared with chain or belt drive. The gear train is enclosed in a metal guard.

The drum is tilted in either direction by turning a hand wheel which operates the tilting gear through a small pinion, the ratio being 1 to 5. The drum can be locked in any position by pulling a sliding stud into one of several notches on the circumference of the hand wheel, locking it in position.

IMPROVEMENTS IN SULLIVAN AIR COMPRESSORS

The Sullivan Machinery Co., of Chicago, which has for nearly fifteen years been manufacturing angle-compound air compressors, announces certain innovations in them, including the "wafer" air valves and the 3-pass counter current intercooler, both of which are now used on all sizes of these compressors.

The wafer air valves will be used on both intake and discharge ends of both low pressure and high pressure cylinders. They are actuated by the pressure of the air itself and not by any mechanical action of the compressor. They will be of standard wafer design, consisting of thin, flat rings of special alloy steel resting on carefully ground seats of the same shape. After opening, they are seated by annular springs, one to each inlet value and two nested together to a discharge valve.

The 3-pass intercooler consists of a cast iron shell divided into three compartments each containing a nest of copper or aluminum tubes through which cooling water circulates and around which the air passes, three times across each nest of tubes.

In the portable compressor, gasolene engine driven, a new transmission has been provided. The reduction gearing consists of high-carbon, double treated pinion and gear mounted on shafts of the same material, supported in heavy Timken bearings; gears and bearings being enclosed in an oil-tight housing.

Both these engines were exhibited at the Chicago Road Show.

AIR BRAKES ON TRACTORS

A new tractor truck is being manufactured by the Four-Wheel Drive Auto Company of Clintonville, Wis., which is equipped with an air brake, air braking power being furnished for the brakes on the trailer as well as for the truck. The purpose of this is to furnish a means of preventing the loaded trailer from crowding the power unit when descending grades.

LINK-BELT GASOLINE SHOVEL

The Link-Belt Company of Chicago has recently developed a shovel attachment for its gasoline crawler crane, shovel and crane booms being interchangeable. The dipper is ¾-yard capacity, of the Mesaba type made entirely of manganese steel. The dipper stick is 15 feet long and the boom is 24 feet center to center. Crowding motion is performed by a rack and pinion actuated by a combination of the hoist and hold ropes used on the ordinary clam-shell bucket hoist. The full power of the 60-horsepower gasoline engine can be used in the crowding motion.

How to Cut Tapping Costs

Good workmen demand good tools—and they expect you to supply them.

The right man with the right machine and the right tools can do twice as much work per day as he could do with poor equipment. The

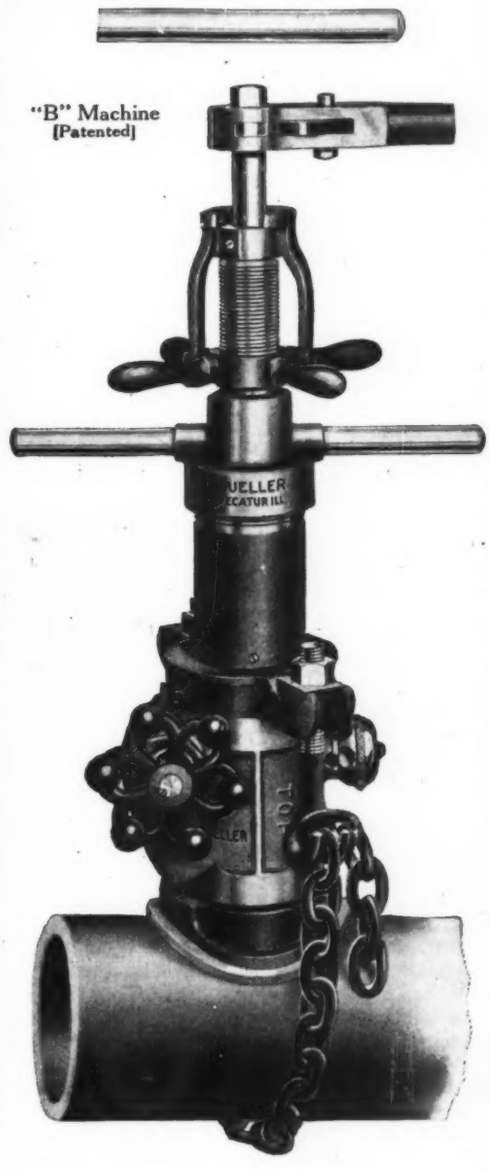
MUELLER "B" Tapping Machine

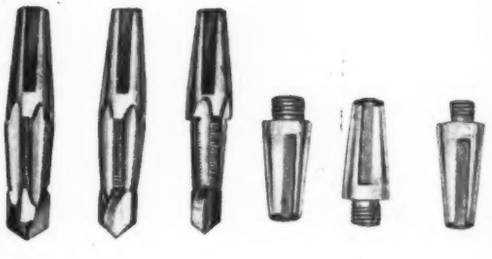
lowers tapping costs. It will safely tap and insert corporation stops from ½" to 1" and will tap only up to 2". The Mueller "B" Tapping Machine is used by nine-tenths of the public service companies in the United States—because it reduces tapping costs — speeds up work—and rarely requires repair, and can be overhauled yearly at modest cost. Look over your tapping machines and send them in for overhauling this month.

Detailed descriptions and prices on request.

Mueller Co., Decatur, Ill.

Branches: 145-149 W. 30th St., New York City; 1072-76 Howard St. San Francisco 2468 Hunter St., Los Angeles





WATER PLUMBING MUELLER BRASS GOODS AND GAS BRASS GOODS

MEMBERS THE NATIONAL TRADE EXTENSION BUREAU OF PLUMBING AND HEATING INDUSTRY

INDUSTRIAL NOTES

OPERATING BRICK KILNS

The four heavy clay products associations, including the N. P. B. M. A., have published the results of an investigation made by the Ceramic Experiment Station and the Fuel Division of the U. S. Bureau of Mines, in cooperation with the four associations. The book, entitled "The Burning Problems of Industrial Kilns," is one of 182 pages, 8 x 11 inches, containing numerous tables, diagrams and other illustrations. The investigators believe that the conclusions reached will be of great benefit to brick manufacturers.

CORRUGATED BAR COMPANY

The Corrugated Bar Company of Buffalo, has been purchased by the Kalman Steel Company of Chicago, which claims that it is now the largest distributor of reinforcing steel bars in the United States. The plants of the Corrugated Bar Company were taken possession of in February by the Kalman Company, these plants being located at Buffalo, Hammond, Ind., Boston, Philadelphia and Atlanta. The Kalman plants are located at Chicago, New York, Youngstown, St. Paul and Minneapolis.

The executive offices of the enlarged Kalman Steel Company are at 22 West Monroe St., Chicago, but about April 1st will be moved to the Wrigley Bldg., Chicago. Paul J. Kalman is president of the Company, George E. Routh, Jr., is vice-president and general manager, J. A. Cathcart is assistant vice-president, A. E. Pinard is treasurer, A. P. Clark is general manager of sales, W. S. Thompson is chief engineer and L. O. Helgeson is eastern sales manager. Messrs Clark and Thompson formerly held similar positions with the Corrugated Bar Company.

ELECTRIC TRUCK SHOW

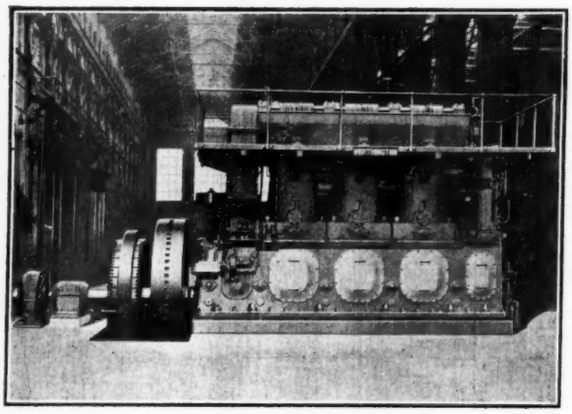
New York's annual electric truck show will be held on April 19th to 26th in the showrooms of the New York Edison Company, Irving Place and 15th Street. An electric truck parade down Fifth Avenue will be given on Saturday, April 19th. April 23rd has been set aside as Public Service Day.

STREET RAILWAY PAVING

W. S. Godwin Company of Baltimore reprints from the Electric Railway Journal an article entitled, "Paving Troubles Along the Rail," in which is described a method for permitting rail movement while preserving the bond and strengthening the edge of the pavement—a method developed by the W. S. Godwin Company by using a rigid strip of steel set securely in the pavement, asphaltic waterproofing material being used between the rail head and the steel guard sufficiently flexible to allow rail movement and preventing seepage and its resulting damage.

NON-STOP RECORD FOR DIESEL ENGINE

The Worthington Pump & Machinery Corporation reports that a Worthington Snow Diesel Engine used by the city of Horton, Kans., for city lighting and power has run continuously for 202 days under actual working conditions. In reporting upon this, J. J. Lindsay, commissioner of finance of Horton, remarks: "I have suggested to Supt. Guenther that he might reduce operation cost by locking the building and laying off the engineers. It seems a shame to have men wearing their trouser seats out just watching perpetual motion."



WORTHINGTON DIESEL ENGINE.

The engine is a standard 562-horsepower, 4-cycle, air injection type, operating at 225 r.p.m., driving an alternating current generator in parallel with another unit. The engine has three 22½ x 22½ cylinders. The pistons are air-cooled. Lubrication is forcibly fed to all parts.

SULLIVAN MACHINERY COMPANY

Since February 1st the Birmingham, Ala., office of this company has been situated at 2108 Fifth Ave., North, where there is larger ground-floor space than at the former quarters in the Brown-Marx Building. G. P. Small is the local manager for Alabama.

NEW PLANT FOR ADAMS & COMPANY

The plant of J. D. Adams & Company of Indianapolis, manufacturers of Adams Adjustable Leaning Wheel Graders, was burned on February 1st, but before the smoke had cleared away plans were being drawn for a new building and a modern plant. Meantime production is going forward in temporary quarters. As the company also has in warehouses and agencies throughout the country sufficient finished stock to take care of normal demands for two months and semi-finished machines to provide for an additional month's business, it reports that for several months it will be able to fill all orders promptly out of stock and, before this is exhausted, expects to have the new plant in full operation.

METCALF AND EDDY

This firm of consulting engineers of Boston announces that John P. Wentworth, who has been one of their assistant engineers since 1911, was admitted to the firm as a junior partner on January 1st of this year.

DYNAMITE AT 35 DEGREES BELOW ZERO

This winter, tests have been made of straight 40% dynamite subjected to a temperature of 35 degrees below zero which, it is said, demonstrated that it is possible to use dynamite in roadbuilding and all kinds of open construction work under any temperature encountered in the United States. The dynamite tested was made by the DuPont Company on a low-freezing formula. The test showed that even with the temperature below zero, charges could be shot by the propagation method, one cartridge detonating others a foot away.

BRICK PAVING SPECIFICATIONS

The National Paving Brick Manufacturers' Association has issued a set of specifications covering all the elements of any kind of brick pavement—sub-drains; foundations; concrete or brick integral curbs; base of concrete, rolled gravel or stone; sand, bituminous, and cement grout fillers, etc.—in a loose-leaf form so that any desired combination can be made and bound together to cover any type of construction. They do not differ in any essential from former specifications, although the wording has been changed in places. They have been reprinted from "The Construction of Vitrified Brick Pavements," recently issued by the association.

The association particularly stresses the importance of under-drainage and elimination of water, as well as designing the pavements to meet local conditions. It does not believe it good engineering to use uniform specifications for every street in a city or for the entire length of a five-mile stretch of road. "It is conceivable that the design might wisely be altered half a dozen times or more on as many different streets or as many miles of highways.

NEWS OF THE SOCIETIES

CALENDAR

April 16-18 — TEXAS SECTION, AMERICAN SOCIETY C. E. Annual meeting at Brownsville, Texas.

April 25—NEW JERSEY SEWAGE WORKS ASSOCIATION. Annual meeting at state house, Trenton, N. J.

May 12-14—AMERICAN ASSOCIATION OF ENGINEERS. Annual meeting at San Francisco, Cal.

May 13-15—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting at Chalfonte-Haddon Hall, Atlantic City, N. J.

May 19-23—AMERICAN WATER WORKS ASSOCIATION. Annual convention at Hotel Astor, New York City. Secretary, J. M. Diven, 153 West 71st Street, New York.

June 18-20 — AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual convention at Pasadena, Cal.

June 23-28—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting at Chalfonte-Haddon Hall, Atlantic City, N. J.

June 25-28 — SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Annual meeting at Boulder, Colo.

Sept. 23-26—NEW ENGLAND WATER WORKS ASSOCIATION. Annual convention at Powers Hotel, Rochester, N. Y. Secretary, Frank J. Gifford, Boston, Mass.

Sept. 29-Oct. 3—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention at Hotel Copley Plaza, Boston, Mass.

BOSTON SOCIETY OF CIVIL ENGINEERS.

This Society has voted by letter ballot, 328 to 101, to withdraw from the Federated American Engineering Societies, or, as it is now called, The American Engineering Council. The letter ballot was canvassed on March 19th. Many of the ballots were accompanied by statements as to the reasons for voting for and against the proposition. Some believed that the payment of $800 a year to the Council from the Society's dues had restricted its local activities; others objected because the ideals of the Council did not appear to be actually realized, and because the American Society of Civil Engineers and the American Institute of Mining and Metallurgical Engineers had not joined and thus the Council was not truly representative.

On the other hand, many opposed withdrawing on the ground that objections to the results obtained were due to the immaturity of the organization, and that increased recognition of engineers depended upon the ability to organize and administer.

AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS.

The annual convention of this Society will be held at Hotel Copley-Plaza, Boston, Mass., on Sept. 29th to Oct. 3rd, the executive committee having decided upon this location in general accordance with the expressed opinion of the Society at last year's convention that the 1924 convention should be held in New England or northern New York.

NEW JERSEY SEWAGE WORKS ASSOCIATION.

This Association will hold its annual meeting at the State House in Trenton on April 25th. At the meeting Dr. William Rudolfs will explain some of the later work of the sewage experimental station at New Brunswick, H. M. Baumont will describe Philadelphia's new sewage treatment works, and W. DeWitt Vosbury will discuss the subject of settling tanks.

CHATTANOOGA ENGINEERS CLUB.

The engineers of Chattanooga, Tenn., have organized a club which it is planned will meet weekly at luncheons. At the organization meeting on March 31st, O. J. Miller, hydraulic engineer of the Tennessee Electric Power Company, was chosen as president, A. F. Perzelius, superintendent of the Chattanooga Water Company, vice-president, W. R. King, engineer of the United States Geological Survey, as secretary, and J. E. Morelock, chief engineer of the Converse Bridge Company, as treasurer.

BOSTON AFFILIATED TECHNICAL SOCIETIES

The Affiliated Technical Societies of Boston and the Associated Industries of Massachusetts will meet together on Tuesday, April 29th, to discuss the principal features of the Report of the Power Investigating Committee of the Associated Industries.

About a year ago, a conference was held under the auspices of the Associated Industries for a discussion of the power possibilities of Massachusetts and of New England. Col. Chas. R. Gow, well known in the engineering profession, and President of the Associated Industries at that time, presided, and brief addresses were made by a number of users of power and by representatives of the public utility companies. This meeting resulted in the appointment of a Power Investigating Committee, created to make a survey of the *power facilities, requirements* and *possible sources of supply* in New England, and to make suitable recommendations to the manufacturers of Massachusetts as to what procedure should be followed and what backing should be given to proposed methods of improving the water power supply.

The personnel of this committee is: Chas. T. Main, Chairman, B. Preston, Clark, George L. Finch, Henry I. Harriman and Prof. Dugald C. Jackson. The work has extended over a period of approximately a year and the report is now in the hands of the printer, to be released the latter part of April.

The fact that this subject is of vital interest to such a large number of engineers, together with the fact that engineers, *members of the Affiliation*, had so much to do with the preparation of this report of the Power Investigating Committee, has led the special committee, appointed to arrange for an Affiliation meeting, to select this topic for the April meeting. The Associated Industries, under whose auspices this fact-finding committee has functioned, have cooperated with the Affiliation to the fullest extent in order that this joint meeting might be held.

The "high spots" of the report will be presented and discussed briefly by Chas. T. Main, Dugald C. Jackson and Henry I. Harriman.

TRANSPORTATION ARRANGEMENTS AMERICAN WATERWORKS ASSOCIATION

Transportation arrangements have been made for the convention of the Association in New York May 19th to 25th, the Transportation Committee announcing that it has completed arrangements with the Michigan Central for a very attractive trip from Chicago, being by rail to Albany and thence by the Hudson River Day Line steamer to New York; the train leaving Chicago at 9:45 A. M. May 17th and reaching New York at 5 P. M. May 18th.

The customary reduced rate of one-half fare for the return trip on the certificate plan has been arranged for. Requests for reservations should be forwarded to R. V. Holmes, A. G. P. A., Michigan Central Railroad, Chicago, for the American Waterworks Special leaving on May 17th.

For the accommodation of members from the vicinity of Omaha and St. Louis, the Illinois Central will probably operate through sleepers to Albany to be attached to the Chicago Special, these leaving Omaha at 5:26 P. M., May 16th and St. Louis at 11:30 P. M., May 16th.

NEW YORK SECTION, A. W. W. A.

This Section held a meeting on March 19th at the New York Athletic Club, at which, following the customary luncheon, a new member of the Board of Governors was chosen to take the place of Charles R. Bettes, F. E. Beck, chief engineer of the Consolidated Water Company of Utica, being unanimously elected.

Following this, F. T. Kemble, secretary of the New Rochelle Water Company, read a paper on "The Care of the Water Supply," which was discussed by several of the members. The point receiving most attention was that of dealing with algae in reservoirs. In 1912 asterionella was found in each of the New Rochelle reservoirs for the first time and has been troublesome ever since. Of the four reser-

voirs, three have the regular spring overturn, while the fourth and smallest for some reason has an upheaval about every six weeks between May and November, this occuring on two occasion after the reservoir had frozen over. This interfered with the use of copper sulphate, and in one instance air was pumped into the well chamber, while in the second a channel was cut across the center of the reservoir and copper sulphate inserted there, but neither of these gave any appreciable benefit.

In 1912 a laboratory was established at the pumping station, and the engineer has since then made microscopic tests of all water in the reservoirs for algae, daily when necessary but generally weekly. When taste, smell or the microscope indicate any trace of algae, the reservoirs are at once treated with copper sulphate crystals. About 25 pounds of these are placed in each of several bran bags, which are towed behind rowboats across the reservoir in courses 50 to 75 feet apart but not extending nearer than 150 from the gate chamber inlet. The boats have to be rowed more quickly in warm weather than in cold to secure proper distribution of the copper sulphate. Twenty-four hours after treatment, the water may show increased color and odor, but in an additional twenty-four hours both disappear. The copper is dissolved at the rate of 4 pounds per million gallons in the reservoir. It is purchased by the ton in barrels. During sixteen years of the use of copper, there has never been any complaint concerning it.

Discussing this paper, H. Burdette Cleveland, said that in his experience copper sulphate, used as high as thirty-three pounds per million gallons, had had no noticeable effect on taste. Questioned concerning the effect of copper sulphate on fish, Mr. Kemble stated that complaints by consumers were avoided by removing the fish early in the morning before consumers were out of bed and able to see them. John M. Diven believed that these fish mostly were probably carp, who stay at the bottom and probably were killed by crystals of copper sulphate which settled to the bottom before dissolving. Allen Hazen stated that an experiment had shown that fish were killed by the accumulation of dead algae on the gills, thereby shutting off their supply of oxygen; which theory was said by William W. Brush to be undoubtedly correct. Mr. Brush stated that fish also died in large quantities when a reservoir had turned over and deoxidized water was brought to the top.

Mr. Kemble also discussed the matter of maintenance of watersheds. He stated that reliance should never be placed solely on purification, but other precautions should be taken to prevent pollution of the sheds. He stated that getting after violators of the law against the use of polluting sheds was of little use, but believed that better results could be obtained by state boards of health than by water companies. He stated that the New York Board had informed him that it had neither funds nor facilities for activities of this kind. He told of one instance where a farmer some years ago had deliberately changed conditions on his farm so as to pollute the water supply with the idea of compelling the water company to purchase the property. Commenting on this, C. A. Holmquist, of the New York State Department of Health, said that that department had introduced bills in the Legislature designed to give the Board more power in these matters, but that these bills had failed to pass.

ILLINOIS SECTION, AMERICAN WATERWORKS ASSOCIATION.

The meeting of this Society in Urbana March 19th and 20th was preceded by a conference of the operators of Illinois water filter plants at the request of the State Board of Health.

M. S. Ketcham, Dean of the College of Engineering, welcomed the members of the association and spoke of the interest of the University in their affairs. H. F. Ferguson spoke of the filtration plant operators' conference which had been held during the two preceding days and also presented details giving data of the construction and operation of water treatment plants in Illinois. In a disscussion on filter sands led by Paul Hansen the sizes of sieves and the advisability of specifying effective sizes and uniformity coefficients of sands were discussed. C. W. Parsons presented a paper on Water Works and Fire Protection of Small Municipalities suggesting substantial storage capacity, duplicating of pumps and mains, use of mains larger than 4 inches, and use of hydrants in sufficient number and of sufficient size.

At the Wednesday evening session W. W. DeBerard gave views of engineering affairs as seen by an editor citing many notable and interesting events. M. M. Leighton spoke of the various water bearing strata in the State, the relation of water reservoir projects to geologic data, and information available from the State Geological Survey Division.

The officers elected for the coming year are: Chairman, A. M. Buswell, Chief State Water Survey Division. Vice-Chairman, L. R. Howson, of Alvord, Burdick & Howson. Trustee C. M. Roos, Secretary & Superintendent, Cairo Water Co. Treasurer, H. E. Keeler.

Other officers are W. R. Gelston & W. E. Lautz, Trustees and G. C. Habermeyer, Secretary.

W. W. DeBerard moved that a committee be appointed by the chairman of the section to represent the Water Works Association, Board of Health, Water Survey, and University to consider ways and means of coordinating filter plant operators' conferences and Illinois Section activities. The motion was seconded and carried.

At the Thursday morning session W. B. Bushnell spoke of over chlorination for the control of tastes in the Champaign & Urbana Water Company supply and similar experiences at other plants were spoken of in discussion. W. U. Gallaher pointed out that alum floc is of variable composition and is probably not aluminum hydroxide. E. M. Partridge presented a very interesting paper on Boiler Compounds giving some interesting information on the preparation of boiler compounds which hitherto has not been presented to the general public. Wm. E. Stanley presented data collected by E. E. Ruthrauff, chief operator of the Decatur filtration plant showing that during the past year since the new reservoir of about six billion gallons capacity has been in use the turbidity of the raw water has been much less and the color somewhat higher than previously. The paper on Observation of Purification-Plant Designs by S. T. Barker was read by M. LeBosquet. The new proposed bacteriological standards for drinking water would probably be more lenient in the long run than the present standards according to the data in the State Water Survey files presented by A. M. Buswell and R. A. Shive.

During the Thursday afternoon session G. C. Habermeyer spoke of decrease in yield of wells due to reaction of waters and gave methods of measuring yields and water levels used by the State Water Survey Division. F. G. Gordon spoke on Cast Iron Pipe Prices, giving prices for many years and various months in the year which seemed to disprove the fact that any considerable sum has been saved by buying pipes during winter months. John W. Mabbs, President of Mabbs Hydraulic Packing Company, spoke on packing and the effect of braided rawhide for pump packing.

The attendance was about 80, including 36 members and representatives of the associate members of this section.

PERSONALS

Baker, Harold W., formerly engineer of the Rochester Bureau of Municipal Research, has been appointed commissioner of public works of that city.

Scott, Major-General Hugh L., on March 18th was re-elected chairman of the New Jersey State Highway Commission.

Lewis, Nelson P., for eighteen years

(*Continued on page 46*)

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

BARBER-GREENE VERTICAL-BOOM DITCHER

This make of ditcher has been given several improvements over last year's model, but with no changes in the basic design. The vertical boom has been made more efficient by a re-design in the buckets, which have been made deeper and the cleaning lip has been given a greater swing. Also, sides have been added to the bucket and the projection of the teeth has been extended.

Another important feature is the interlocking arrangement. In digging position, the buckets rest upon one another so that the digging pressure is distributed along the whole bucket line as in a column, which prevents the line from doubling in.

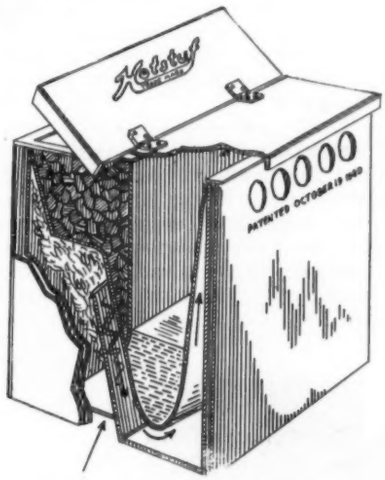
Protection to the boom is afforded by an overload release sprocket, which makes unnecessary either friction clutch or breaking bolt safety devices. The sprocket slips when any overload is placed on the boom, returning immediately to operating position and slipping again if the overload is still present, repeating this until the stone or obstruction is dislodged or removed otherwise.

The new crawler is made 3 inches longer, and the load on it is distributed better by mounting the motor just outside the frame instead of just inside, which mounting also permits eliminating one countershaft. The gasoline engine has been increased to 38 h. p.

This machine will dig a trench to a maximum depth of 5½ feet. Digging feeds of 12, 18, 24 and 36 inches per minute are provided. Traveling speeds are 45 ft., 91 ft. and 183 ft. per minute, and a reverse of 48 ft. The conveyor can be changed readily so as to discharge on either side. The machine is 15 ft. 8 in. long over all and 5 ft. 8½ in. wide on the ground. The shipping weight is about 14,400 pounds.

"HOTSTUF" ASPHALT HEATER

An asphalt and pitch heater, especially designed to use oil fuel, is manufactured by the Mohawk Asphalt Heater Co., of Scotia, N. Y. They are claimed to be safe for use inside buildings and can be stationed right alongside the work, eliminating carrying of hot asphalt. It is said that a 50-gallon heater has melted Trinidad Lake asphalt at the rate of 700 pounds an hour, or double the rate of a wood-burning kettle.



"HOTSTUF" ASPHALT HEATER. Asphalt is placed in top; burner introduces flame underneath; melted asphalt flows into reservoir, from which it is drawn off by valve—no dipping or splashing.

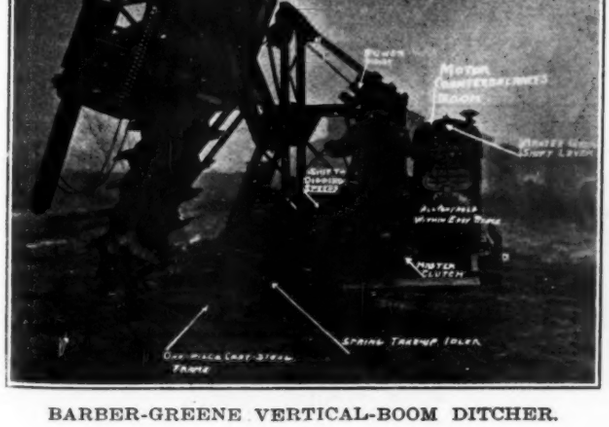
These heaters are especially designed to take care of sediment and coking problems. The hottest part of the flame is under the cold material, and the melted material, as it runs into the storage reservoir (recognized in the drawing by its U-shaped bottom) is kept at the proper working temperature by the hot gases down and under the reservoir on their way to the openings (on the right-hand side of the drawing). There is thus no danger of overheating and destroying the life of the bitumen.

The sediment is carried into the reservoir, leaving the hot plate clean, to transmit the full effect of the heat to the bitumen. As this flows away as soon as melted, the plate does not get overheated and the life of the heater is lengthened,

The heater is surrounded by a double wall, affording insulation that reduces loss of heat. The temperature is easily controlled by regulating the end type Aeroil burner. It is claimed that this heater melts pitch at as low as 80 cents a ton and asphalt at $1.20 a ton. The heaters are made in 50-gallon and 100-gallon sizes, mounted on two wheels.

"DOMESTIC ENGINES"

The Domestic Engine & Pump Company of Shippensburg, Pa., is now furnishing small pumps and hoists equipped with two-cylinder 5-8-horsepower engines in addition to their regular line of single-cylinder engines. This engine is combined with hoisting units, trench force pumps, etc. It is a 2-cylinder, 4-cycle, water-cooled 5-8-horsepower gasoline engine completely enclosed in a metal housing. The en-



BARBER-GREENE VERTICAL-BOOM DITCHER.

"DOMESTIC" 150 CU. FT. COMPRESSOR UNIT.

gine is complete with high tension magneto, speed control governor, radiator and cooling fan, and reduction gears for power takeoff. The firm also manufacturers a portable air compressor utilizing four engine cylinders to operate a 2-cylinder compressor. In this plant the width of housing is 36 inches and the over-all width of trailer 5 feet 6 inches and overall length 9 feet 6 inches. It has an air displacement capacity of 150 cubic feet.

THE HAVELOCK ROAD MAINTAINER

The Highway Maintainer Co. of Lincoln, Neb., makes the "Havelock" road maintainer for use on dirt and gravel roads. It is claimed to be the first maintainer to introduce the multiple-blade feature. By providing the blade in four sections, these can be adjusted to any road cross-section and complete the surface in one trip. The outer, extension blade can be removed for use on narrower roads. A rake behind the inner or discharge end of the blade breaks up any lumpy material.

A master lift enables the operator to raise all blades at once, and to adjust the depth of cut. A special mould board construction causes a downward pull on the blades—they do not have to be forced into the ground. Large rear wheels are used—small ones are believed to have proved a failure. The long wheel base, 17½ feet, is considered a great advantage in passing over depressions or soft spots.

For draught a 15-30 h. p. tractor may be used, or a 2-ton f.w.d. truck, or six or eight horses. The total length of blades is 13½ ft. without extensions, with a 2-in. lap of the four blade sections, each of which is 42 in. long. The cutting edges (detachable for sharpening) are of 5x5/16 in. crucible steel. The front wheels are 24 in. and the rear ones 40 in.

REVOLVING SEWAGE SCREEN

An automatic revolving sewage screen known as the "Garfield" is manufactured by the Simplex Ejector Company of Chicago, which has acquired the sole rights in the United States, the screen having been used in Europe for several years in connection with city and industrial disposal plants. The appliance consists of six arms, each carrying a flat screen fastened to a revolving shaft. Material collected on the screens as they revolve through the sewage is removed by mechanical scrapers having hard rubber soles which scrape the material onto a belt conveyor as each screen rises to a comparatively horizontal position. The screen is made with widths of mesh from 1 inch to 1-16 inch.

ALUMINITE STREET MARKERS

The Standard Manufacturing Company of Cedar Falls, Iowa, manufactures a street marker which it calls the "Aluminite," the nameplates being solid aluminum and therefore not subject to rust. They are set on extra heavy posts of high carbon steel which are galvanized to resist corrosion. The plates are carried on a head so designed that they can be set making any desired angle with each other.

Each panel is cast of aluminum in one solid piece ⅜-inch thick with a heavy molding around the edge and plain, easily read letters in relief. The letter and molding are highly polished, while the background is a tippled surface covered with weatherproof black enamel, and the sign can be read as easily from the light of an automobile as in broad daylight.

The aluminite markers may also be attached to standing poles, electroliers, the sides or corners of buildings, etc.

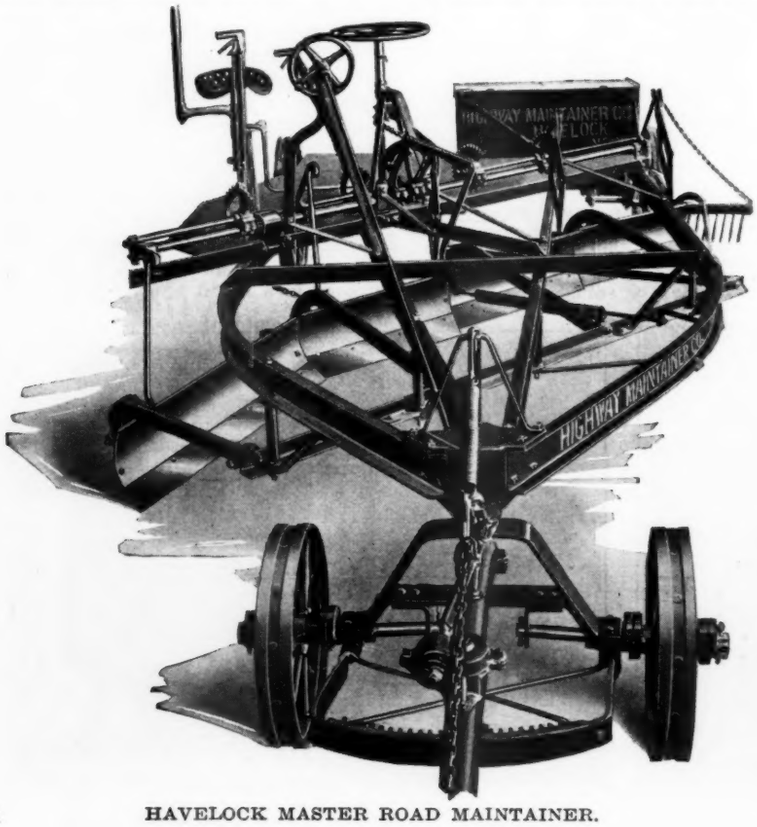
CUSHIONED AXLE FOR LITTLEFORD HEATERS

Littleford Brothers, of Cincinnati, has designed a "spring cushioned" axle (patents applied for) which is being incorporated in the construction of all No. 69 maintenance heaters.

This construction is in the nature of a cushioned axle, provided by the use of strong helical springs built into the chassis of the heater. It is claimed that this will nearly double the life of the heater, as it absorbs all shocks, preventing broken wheels or hammering to pieces of the heater body through impact with the road. This feature also tends to speed up transportation, permitting rapid trailing without injury.

Another feature that has been added to this type of heater is the pavement protecting ash pan, which is located directly under the fire box. Littleford Bros. is placing this heater on the market at the same price as its predecessor, notwithstanding the extra cost of construction.

Hyatt roller bearings and rubber tires are listed as optional features at a slight additional cost. A special bulletin A-3 has been issued describing in detail this latest improvement.



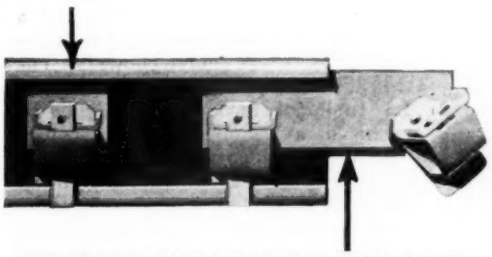
HAVELOCK MASTER ROAD MAINTAINER.

NO. 69—MAINTENANCE HEATER—EQUIPPED WITH "SPRING CUSHIONED" AXLE.

IMPROVED HELTZEL ROAD FORM

Because of the increasing weight of road making machinery, J. N. Heltzel of the Heltzel Steel Form & Iron Co. of Warren, O., has developed a form which is claimed to be more strong and rigid than any before manufactured.

The essential feature of the improvement is a heavy steel reinforcing joint bar 15 in. long, with a strong steel stake pocket at each end, which act as expanding members and when locked in place lock the rail ends firmly together. The stake pockets swivel around a ⅝-in. rivet so that the stakes can be driven at any angle. The stakes, which are of high-carbon steel, are locked in the pocket after being driven.



IMPROVED JOINT FOR HELTZEL ROAD FORM.

In setting the form, one section of the road rail is set to grade and the reinforcing bar set in place with half its length projecting from the end of this rail, locked in place by the expanding member, and the stake driven. The next rail is then hung on this projecting end in close contact with the first rail, locked in place, and the other stake driven. This makes it impossible for one rail to be forced lower than the adjoining one at the joint.

This joint can be used in connection with old Heltzel rails with 6-in. base, simply substituting them for the former type pedestal.

SCHRAMM COMPRESSOR-TRACTOR

Schramm, Inc., of West Chester, Pa., has placed on the market a compressor-tractor combination, consisting of a Schramm horizontal, double cylinder, belt driven air compressor unit, attached to a standard Fordson tractor.

The compressor is mounted on a two-wheel trailer attached to the standard rear axle housing of the Fordson tractor and held in place by a hinged joint which allows the compressor and tractor to be taken over extremely rough surfaces. Power is transmitted from the Fordson power unit direct to the compressor by means of a heavy, double leather belt. The wheels under the trailer are the same as those used under the front of the tractor and the steering apparatus is connected direct to the steering wheel of the tractor.

The trailer axles have the same tilting feature as those embodied in the front axles of the Fordson and this allows the unit to be taken over any obstruction. The outfit can be moved about on the job, or from job to job, under its own power, thus giving the contractor a self-propelled air compressor unit.

Only ten minutes is required to connect the compressor to any standard Fordson tractor, and when the compresser is not in use, the tractor can be used for other jobs by simply removing the belt and four bolts, which ordinarily requires about five minutes.

PAGE "HI-WAY GUARD"

The Page Steel & Wire Co. of Bridgeport, Conn., has this year brought out a guard fence of wire to replace rails, walls or cable at embankments, turns or other dangerous points on highways.

This guard fence is a special 24-inch, wire-link fabric, claimed to be the strongest and most elastic type of woven wire made. The mesh is 1½ x 1½ inches, of No. 9 wire, either steel or Armco iron. It is galvanized and painted white, protecting the fabric and making it highly visible at night. Loose pickets are furnished to join two rolls of fabric together in the same manner that the wire is woven, making it continuous to any length. It is attached to posts by ordinary 1½-in. staples.

The mesh absorbs impact, the fabric stretching and narrowing but not breaking. Under a test, an 8-foot section received without breaking four impacts of a 650 lb. weight at speeds up to that giving a blow equivalent to a 3,000 lb. car traveling at 20 miles per hour. In another test made by running an automobile into it, the car when going at moderate speed was stopped and pushed back into the road. At high speed, the fence stretched but stopped the car.

The fabric is shipped in rolls of 100 feet length. Either steel or Armco iron is furnished, as the purchaser may designate.

HIGHWAY MOWER

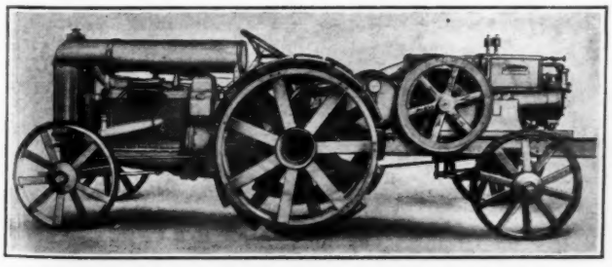
The Rawls Machine & Manufacturing Works of Chicago, Ill., manufactures a highway mower for cutting weeds and other vegetation along the sides of highways. It cuts at any angle, to six feet below the road, at six to eight miles per hour. It is of all steel construction, the frame being of 4-in. channels. The axles are furnished with Hyatt roller bearings and all movable parts are fitted with brass bushings. The cutter bar is 5, 6 or 7 feet long.

The mower is towed by an automobile, tractor or other power. If a stump or other obstruction is struck, the cutter bar demounts without injury, and can be replaced and ready for operation in four or five minutes.

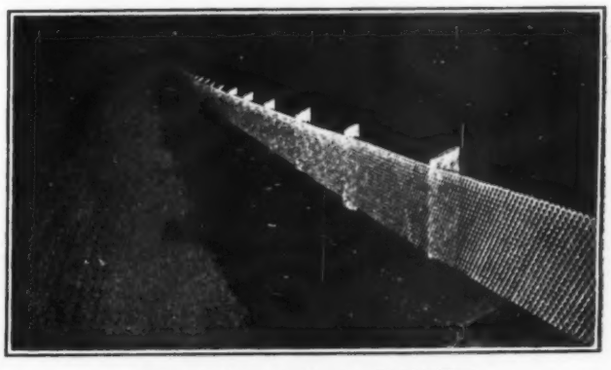
PORTABLE ROTARY SAND HEATER

The Acme Process Asphalt Grouting Company, of New Orleans, has introduced a new machine for heating and drying sand on the work. A mechanical rotating sand heater and dryer is used which is claimed by the manufacturers to overcome all objections found to the use of mastic due to non-uniform heating and drying of the sand; the sand being heated uniformly to the same temperature as the bitumen—usually 250 degrees.

The Public Service Department of



SCHRAMM AIR COMPRESSOR ATTACHED TO A FORDSON TRACTOR.



THE PAGE FENCE AT NIGHT
Shines out "like a good deed in a naughty world."

New Orleans has been cooperating with the company for three years in developing the machine. Asphalt mastic is used for grouting granite block and brick pavements, repairing asphalt pavements, resurfacing brick pavements, etc.

LINK-BELT'S NEW VIBRATING SCREEN

There has recently been put on the market by the Link-Belt Company of Philadelphia a screen for fine separation that is absolutely novel in principle, known as the Link-Belt Vibrating Screen. Heretofore agitation of the screen surface has been obtained by a rapid series of rigidly imparted blows, in some cases through mechanical, but preferably electrical devices. It is obvious that this results in lack of uniformity over the screening surface, the vibations being more intense on those portions of the screen nearest the points of impact of the agitators.

Vibrations of the Link-Belt screen are produced by the action of an unbalanced pulley supported on the screening frame and rotated at high speed. The screen box is arranged for one, two or three screen decks, depending upon whether two, three or four sizes of material are produced.

The screen cloth is mounted on removable frames carried within the box, each provided with means for properly stretching the screen cloth.

The screen box is rigidly clamped to the hollow stationary shaft carrying the vibrator pulley, so that the vibrations are imparted directly to it and the screen cloth, and the cloth receives the same intensity of vibration over its entire surface, thus avoiding dead areas and zones of varying intensity.

The screen box, with feed hopper and discharge chute, is suspended from two hollow cross shafts, the ends of which are carried on flat spiral springs mounted upon the supporting structure. It can be enclosed, reducing the amount of dust to a minimum when handling fine light material.

The screen is belt driven and can be used in any place where a small amount of power is available.

The Link-Belt vibrating screen is the invention of Prof. G. A. Overstrom, a mining engineer, who was for many years Dean of the Utah College of Mining, and there was brought into intimate contact with the problems of fine ore concentration. It effects thorough screening through the finest mesh of any product that can be screened.

PARKWAY CABLES

The Hazard Mfg. Co. of Wilkes-Barre, Pa., is manufacturer of the Hazard Steel Tape Armored Parkway Cables, recommended especially for ornamental lighting systems for parks, boulevards, residential districts and small towns; between buildings of industrial plants; for railroad service under crossings or in yards, and for transmitting current in mines. Protection to the rubber insulated conductor is furnished by: first, a tape or weatherproof braid on each conductor; second, a heavy sheath of pure lead surrounding a pair of conductors; third, a layer of asphalted jute over the lead; fourth, two layers of steel tape wound spirally in the same direction, the second layer covering the laps of the first; and finally, a heavy covering of asphalted jute, soapstoned to prevent sticking.

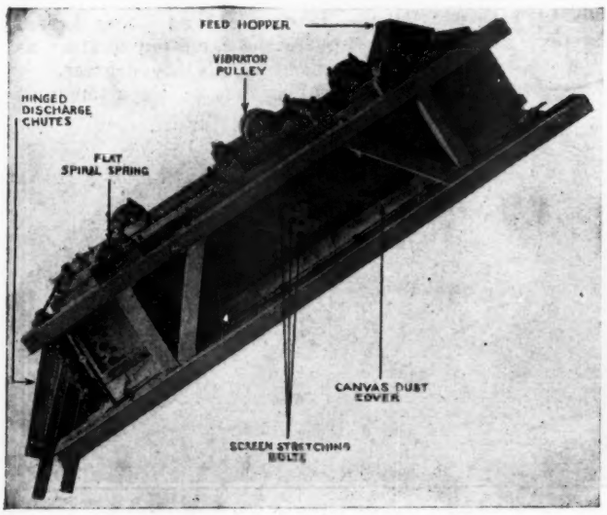
To install these cables it is necessary only to dig a narrow trench 12 to 15 inches deep, place the cable directly on the bottom and cover it with the replaced soil, no conduit or other protection being necessary. It is also laid under street pavements by removing the narrowest possible width of pavement and base, placing the cable 3 inches beneath the bottom of the base, and then relaying pavement.

POST HOLE DIGGER

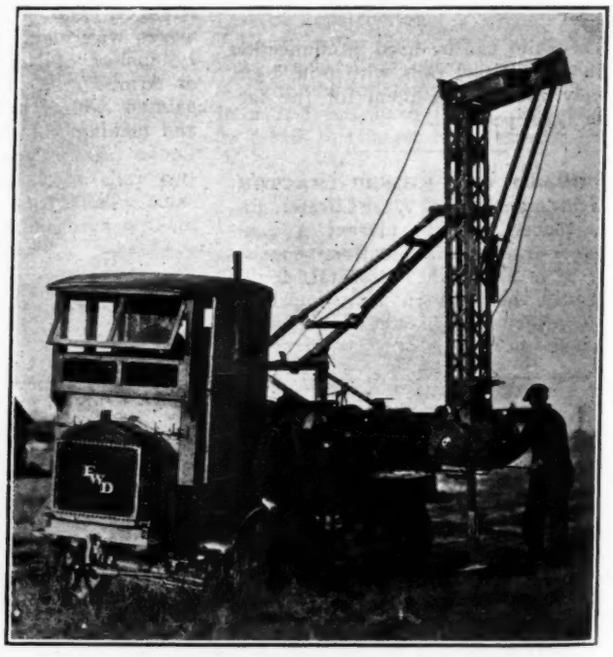
An earth boring machine mounted on an auto truck, by which holes can be bored for telegraph and other poles and the poles set therein, is furnished by the Four Wheel Drive Auto Co. of Clintonville, Wis., which has recently acquired exclusive rights for this earth borer from the International Earth Boring Machine Co.

The borer is mounted on an F. W. D. chassis weighing 7,860 lbs., having a turning radius of 25 ft. 6 in. and a speed of 15 miles per hour, the engine having 54 brake horse power. The transmission ratio may be varied from 1:1 to 4.75:1 in low; or to 8.19 by means of a Debooster gear assembly, used when bad going is encountered.

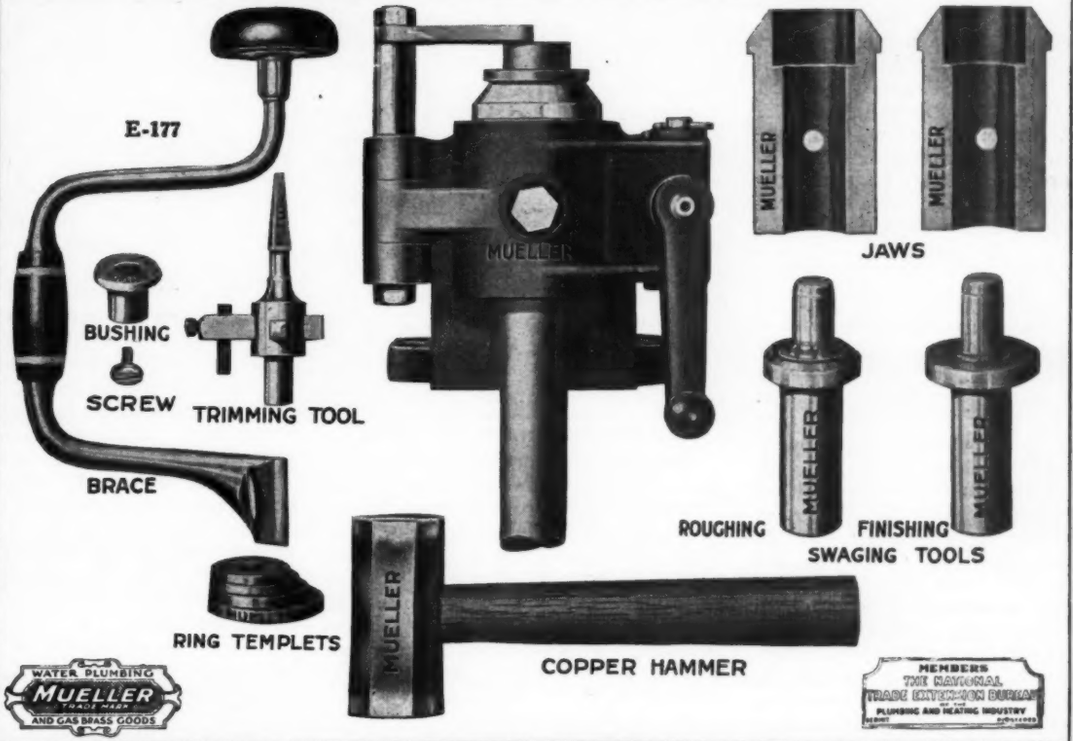
The auger is mounted on a tower which is carried in a horizontal position on the truck when not in use. For use it is raised to a vertical position, and can be set at any position in the rear or on either side of the truck. When the truck has been spotted, the emergency brake set and the wheels chucked, the power is applied to the boring machine, the hole bored, and the auger removed. The pole is then set in it by use of a cable that passes over pulleys at the top of the tower and boom. It is claimed that the auger will dig in any soil except rock. Ordinarily 20 in. and 24 in. augers are furnished.



LINK-BELT VIBRATING SCREEN.



DIRT AUGER DRILLING POST HOLE.



MUELLER
Lead Flanging Machine

Every mechanical detail in this machine has been so carefully worked out that no previous experience is necessary to make perfect leak-proof, non-loosening joints—either at the shop bench, or right on the job.

Mueller lead flange connections can be made easily, quickly and very economically. The machine can be used in either a vertical or horizontal position. The operation does not depend upon expert knowledge or practice.

Write for detailed descriptions and prices.

Mueller Co., Decatur, Illinois, U. S. A.

145-149 W. 30th St., New York; 1072-76 Howard St., San Francisco; 2468 Hunter St., Los Angeles

INDUSTRIAL NOTES

MAURY AND GORDON

Dabney H. Maury announces that Fred G. Gordon, formerly his principal assistant, has become associated with him as partner, the firm name being Maury & Gordon. They will continue the practice of hydraulic, sanitary and mechanical engineering, including investigations, designs, estimates and supervision of construction for waterworks, sewerage systems, power plants and the appraisal of public utilities.

CATERPILLAR SERVICE SCHOOL

The Holt Manufacturing Company held a "caterpillar" service school the last week in February at its factory in Peoria, Ill. These schools were originated by M. M. Baker, vice-president and general manager, and H. H. Chambers, director of service, and are conducted primarily for the benefit of users of these tractors and mechanics who wish information concerning the operation and care of them. This school was attended by about two hundred men from fourteen different states. To facilitate giving the instruction, cut-away motors, transmissions, clutches, final drive units, magnetos, carburetors, vacuum tanks, etc. have been prepared. Instruction is given by men who have had years of factory and field experience. Plans are now being made for one or more additional schools during 1924 for the benefit of those who were unable to attend the session in February.

GENERAL MOTORS TRUCK SALES

That the sales of motor trucks during the first two months of 1924 by the General Motors Truck Company exceeded by 21% all previous records for the same period was reported by Vance H. Day, the general sales-manager. Mr. Day attributes this increase to improved business conditions, the wider use of motor trucks and the elimination from competition of discarded war equipment. The Company has opened a new factory branch in Cleveland with 20,000 square feet of floor space.

SEWAGE SCREENS FOR MILWAUKEE

The Tark sewage screens furnished by the Link-Belt Company for the sewage disposal plant at Milwaukee were shipped a few weeks ago, filling seven gondola cars. The material shipped will be assembled into eight screens having a combined capacity of 317 million gallons daily.

CEMENT ASSOCIATION OFFICES

C. D. Franks, formerly district engineer in charge of the Indianapolis office of the Portland Cement Association, has been appointed assistant general manager in administrative charge of work in the districts covered by the Minneapolis, Milwaukee, Des Moines, Chicago, St. Louis and Indianapolis offices. After June 1st his headquarters will be 111 West Washington St., Chicago. He is succeeded in Indianapolis by L. C. Miller, formerly field engineer for the Association in Indiana. A new office will be opened in Charlotte, N. C., with John E. Tate as district engineer in charge. After July 1st the Charlotte office will be in the Johnston Building.

WATER METERS FOR PORTO RICO

The city of San Juan, Porto Rico has awarded to the Badger Meter Manufacturing Company of Milwaukee a contract for furnishing it with water meters, the first order calling for 5,000 meters.

PEARSE, GREELEY & HANSEN

This firm of hydraulic and sanitary engineers announces removal of its office on April 15th from 39 West Adams Street to the Tower Building, corner North Michigan Avenue and Madison Street, Chicago. They will continue to practice as consulting engineers in connection with water supply, sewerage, refuse disposal, flood control, and general hydraulic and sanitary engineering work.

LEAD-HYDRO-TITE COMPANY

This company announces that it has moved its office to 192 Boylston Street, Boston, Mass. This has been made necessary by the expansion of the company's business in advisory and contracting work and the manufacture and sale of material for jointing water pipes.

STREET LIGHTING CATALOGUES

The Westinghouse Electric and Manufacturing Company has issued two supplements to its 1923-24 catalogue, the first describing applications of the Bi-Lux Refractor and the Holophane Two-Way and Four-Way Refractors for overhead street lighting; the second describing the use of the Bix-Lux Refractor for ornamental street lighting. Both supplements show candlepower distribution charts for each of the refractors.

ELECTRIC TRUCK EXHIBIT

In connection with the convention of the National Electric Light Association at Atlantic City May 19th to 23d, there will be an exhibit of electric trucks. The manufacturers have agreed to pool their entire interest for the purpose of selling the electric truck idea to the central station industry, and will utilize the convention for this purpose, having reserved an area of 105x34 feet in which will be displayed charts showing the possibilities of electric truck business for the central station industry. In addition, twelve electric trucks will be exhibited by the society for electrical development and the Transportation Bureau of the N. E. L. A.

RESURAFCING BRICK AND BLOCK PAVEMENTS

A method of resurfacing worn brick and block pavements with asphalt is very simply and clearly presented in a booklet published by the Asphalt Sales Department of the Texas Company. Photographs and cross sections aid in putting over the ideas. Copies can be obtained by addressing the company.

ALLENTOWN'S STEAM TURBINE PLANT

An illustrated leaflet has been issued by the De Laval Steam Turbine Company of Trenton, N. J., describing the waterworks pumping station of the city of Allentown, Pa., the principal equipment of which comprises two centrifugal pumps designed to be driven by either steam turbine or electric motor using purchased electric power. The plant supplies water for 85,000 inhabitants under a pressure of from 40 to 100 pounds.

WESTERN PAVING BRICK MANUFACTURERS ASSOCIATION JOINS THE NATIONAL ASSOCIATION

One of the first actions taken by the Board of Governors of the National Paving Brick Manufacturers Association at its meeting on March 26th was the formal welcoming, by unanimous vote, of the Western Paving Brick Manufacturers Association into membership in the National Association. This marks the culmination of the action of the Western association in voting, at their annual meeting in Kansas City in January, to join the National Association.

With the Western Association now a member, the paving brick industry stands as a united industry.

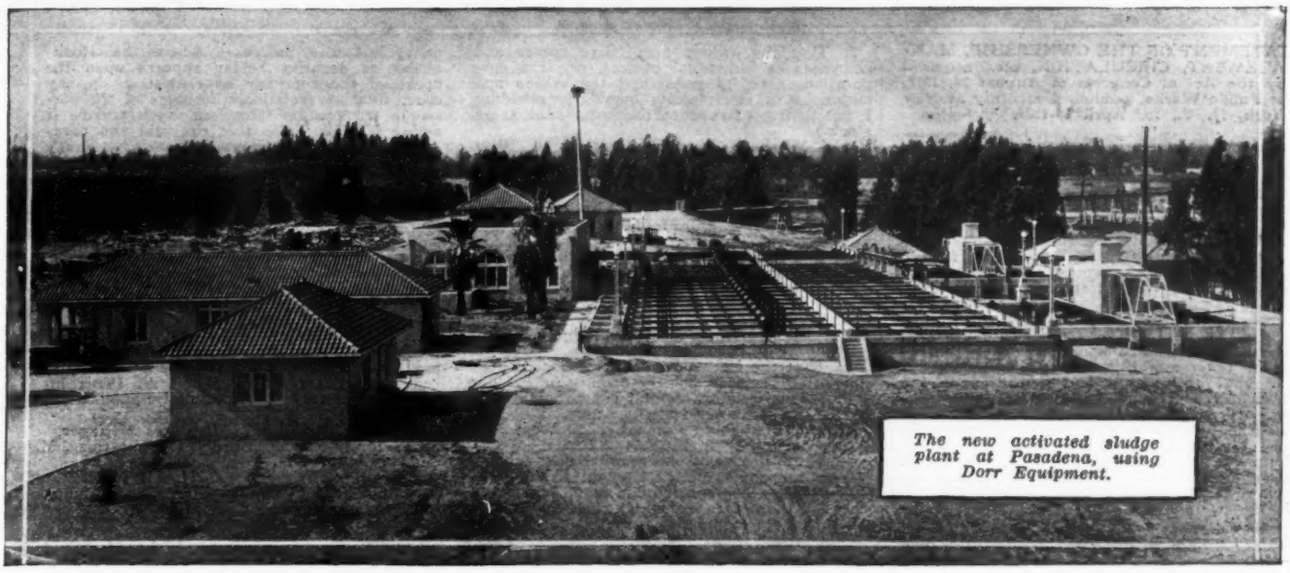
The officers of the National Association were all re-elected, as follows: Chairman of Board, O. W. Renkert; President, R. T. Hutchins; Vice President, Will P. Blair; Treasurer, C. C. Barr; Assistant Treasurer, B. L. Beller; Secretary, Edward E. Duff, Jr.; Assistant Secretary, S. A. Knisely.

EASTON CAR AND CONSTRUCTION CO.

Arthur Prausnitz of Chicago, who has been selling machinery and equipment used in building and maintaining highways and other public improvements, has been appointed District Sales Manager for the Easton Car and Construction Co. of Easton, Pa.

The product of this company is industrial cars, bins for handling materials, dump bodies for trucks, truck turntables, etc.

The Chicago office of the company, in charge of Mr. Prausnitz, is in Peo-



The new activated sludge plant at Pasadena, using Dorr Equipment.

DORR EQUIPMENT

for screening and sedimentation

THE DORRCO SCREEN has proven its superiority as an economical, convenient, dependable method of removing coarse solids from sewage. Not only is its first cost low, but its simple construction and unique self cleansing feature — without brushes, scrapers or jets—makes operating costs nominal. The screenings are automatically drained and delivered for final disposal.

THE DORR SEWAGE CLARIFIER has been adopted as the sedimentation unit in many sewage treatment plants of various types. Installation costs are low because deep excavation and expensive form work are not required. Continuous high removal of solids makes extra tanks unnecessary, gives a high capacity per unit volume and constant detention period.

Bulletin 20

The Dorr Company

Engineers

Sanitary Engineering Department

247 Park Avenue, New York

DENVER CHICAGO LOS ANGELES LONDON, E. C.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, etc., required by the Act of Congress of August 24, 1912, of Public Works, published monthly at New York, N. Y., for April 1, 1924.

State of New York, County of New York, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared James T. Morris, who, having been duly sworn according to law, deposes and says that he is the business manager of Public Works, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and, if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business editor and business managers are:
Publisher—Public Works Journal Corporation, 243 West 39th Street, New York, N. Y.
Editor—A. Prescott Folwell, Montclair, N. J.
Managing Editor—A. Prescott Folwell, Montclair, N. J.
Business Manager—James T. Morris, White Plains, N. Y.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock.)
Public Works Journal Corporation, 243 West 39th Street, New York, N. Y.
Sumner W. Hume, 243 West 39th Street, New York, N. Y.
James T. Morris, White Plains, N. Y.
A. Prescott Folwell, Montclair, N. J.
Contracting Pub. Co., New York, N. Y.
Stockholders of Contracting Publishing Co.:
H. F. Pomeroy, Forest Hills, N. Y.
J. R. Breuchaud, 290 Broadway, N. Y. City.
Frank W. Skinner, 243 West 39th Street, N. Y. City.
H. F. Hackerdorn, Consumers Bldg., Chicago, Ill.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are:
Swetland Publishing Company, 239 West 39th Street, New York, N. Y.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest, direct or indirect, in the said stock, bonds or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (This information is required from daily publications only.)

JAMES T. MORRIS, Business Manager.
Sworn to and subscribed before me this 2nd day of April, 1924.
(Seal) H. H. MINER,
Notary Public, No. 196, New York County.
Register's No. 6001.
(Commission Expires March 30, 1926.)

ples Gas Building, 122 South Michigan avenue.

WOOD PUMP PATENT UPHELD

The Federal Court at Mobile has finally upheld the validity of the patent of A. B. Wood, of New Orleans, for his well-known "trash" pump, after five years of litigation against the Atlantic, Gulf & Refining Co., a large dredging concern, which has paid him $75,000 damages for unauthorized use of a pump held to infringe his patents.

HELTZEL ROAD FORMS FOR FLORIDA

Ten thousand feet of Heltzel "Armor Plate" 9-inch road forms have been ordered of the Heltzel Steel Form & Iron Co. by C. F. Lytle, of Sioux City, Ia., for use on a 75-mile job in Florida. This is the third successive year that Mr. Lytle has purchased Heltzel forms, his purchases now totaling 32,000 feet.

Another large purchase from the same company has been made by the Union Paving Co. of Philadelphia—6,000 feet of 8½-in. forms. The manufacturers report that since placing on the market the new design of support (described in this issue) the factory had to begin operating 24 hours a day.

CAMERON-SPOUSE MANUFACTURING COMPANY.

This company, with offices in Detroit, Mich., announces that it succeeds the Chausse Manufacturing Company, manufacturer of lead melting furnaces, kerosene torches, salamanders and fire wagons; E. B. Cameron and John K. Spouse having bought at receivers' sale all the property, good-will and patents of that company. The patents include two surface heaters for repairing bituminous pavements, one with a 6x6-foot fire pan, the other a track surface heater with a 6x3-foot fire pan. The new company is manufacturing these machines, together with a kerosene asphalt tool heater, torches and other kerosene vapor burners.

WATERWORKS MANUFACTURERS EXHIBITS.

The Waterworks Manufacturers Association announces that, at the coming convention of the American Waterworks Association in New York, the following firms will occupy exhibit space, together undoubtedly with others who will apply for space later:

The American City; Mueller Mfg. Co.; Leadite Company; Neptune Meter Co.; Water Works Equipment Co.; A. P. Smith Mfg. Co.; Fire & Water Engineering; U. S. Cast Iron Pipe & Foundry Co.; Gamon Meter Co.; R. D. Wood & Co.; Union Water Meter Co.; Thomson Meter Co.; Eddy Valve Co.; Lead Lined Iron Pipe Co.; Buffalo Meter Co.; Hersey Mfg. Co.; Pitometer Co.; McWane Cast Iron Pipe Co.; Electro Bleaching Gas Co.; Wallace & Tiernan Co.; Canadian Engineer; Hays Mfg. Co.; Chicago Bridge & Iron Works; Sullivan Machinery Co.; Central Foundry Co.; Engineering & Contracting; Engineering News-Record; Public Works; W. & L. E. Gurley; National Tube Co.; Van Gilder Water Meter Co.; Smplex Valve & Meter Co.; Edward E. Johnson; Bingham & Taylor; National Water Main Cleaning Co.; Pittsburgh Testing Laboratory; Builders Iron Foundry; Badger Meter Mfg. Co.; East Jersey Pipe Co.; Kelly Well Co.; National Meter Co.; American Cast Iron Pipe Co.; Mathieson Alkali Works; Layne and Bowler Co.; Worthington Pump & Machinery Corp.; Rensselear Valve Co.; Kennedy Valve Company.

CHAUSSE OIL BURNER COMPANY.

The Chausse Oil Burner Company of Goshen, Ind., announces the appointment of the following sales agencies:

Bakstad Machinery Co., Peoples Gas Bldg., Chicago, Ill.; W. B. Spencer, 30 Church St., New York City; The Clark-Wilcox Co., 902 Chapel St., New Haven, Conn.; Williamette Equipment Co., Portland, Ore.; Williamette Equipment Co., Tacoma, Wash.; Minneapolis Equipment Co., Minneapolis, Minn., and W. F. Cleary Sales Agency, Indianapolis, Ind.

These representatives will handle the sale of Chausse oil burning tool and surface heaters and contractors' apparatus and salamanders in their respective territories.

DORR CLARIFIERS FOR CHICAGO

Contract was awarded on April 10th to the Dorr Company for thirty Dorr Sewage Clarifiers, each 77 feet square, to be installed in the sewage treatment plant of the North Side Sanitary District of Chicago, which will treat the sewage of about a million people.

(Continued from page 38)

chief engineer of the Board of Estimate and Apportionment of New York City, died March 31st at his home in Brooklyn.

Mead, Elwood, professor of rural institutions in the University of California, has been granted leave of absence and has been appointed commissioner of reclamation in the Department of the Interior, succeeding E. W. Davis, chosen a few months ago by Secretary Work. Mr. Mead will practically take over the engineering work formerly directed by H. P. Davis.

Gilchrist, Gibb, formerly superintendent of federal aid projects for the Texas Highway Department, has been appointed state highway engineer of that state.

Burns, Clinton S., senior member of the firm of Burns & McDonnell of Kansas City, died April 1st.

NEWS OF THE SOCIETIES

CALENDAR

May 19-23—AMERICAN WATER WORKS ASSOCIATION. Annual convention at Hotel Astor, New York City. Secretary, J. M. Diven, 153 West 71st Street, New York.

May 21—WATER WORKS MANUFACTURERS' ASSOCIATION. Annual meeting, Hotel Astor, New York City, 10 A. M. Secretary, John A. Kienle, New York City.

June 18-20—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual convention at Pasadena, Cal.

June 23-28—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting at Chalfonte-Haddon Hall, Atlantic City, N. J.

June 25-28—SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Annual meeting at Boulder, Colo.

Sept.—CITY MANAGERS' ASSOCIATION. Eleventh annual convention, Montreal, Que., Can. Executive secretary, John G. Stutz, Lawrence, Kan.

Sept. 15-18—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention, Topeka, Kan. (Tentative date). Secretary, R. D. Morgan, Mexia, Tex.

Sept. 23-26—NEW ENGLAND WATER WORKS ASSOCIATION. Annual convention at Powers Hotel, Rochester, N. Y. Secretary, Frank J. Gifford, Boston, Mass.

Sept. 29-Oct. 3—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention at Hotel Copley Plaza, Boston, Mass.

Oct. 14-17—NATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention. Partridge Inn, Augusta, Ga. Secretary, William R. Arbuckle, supt. fire alarm, Bayonne, N. J.

November—NORTH CAROLINA SECTION, AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Charlotte, N. C. Secretary, Thorndike Saville, University of North Carolina, Chapel Hill, N. C.

SOUTHEASTERN WATERWORKS ASSOCIATION

The Southeastern Waterworks Association (which succeeds the Tri-State Water & Light Association) held its first national convention under its new title at Atlanta, Ga., April 15 to 17. Representatives were present from seven states, the majority of them superintendents of waterworks or electric light plants or members of municipal water and light boards.

The officers chosen for the coming year were: As president, D. L. Caston of Gainesville, Ga.; as vice-presidents, E. O. Sweet of Birmingham, Ala.; J. H. McLure of Chester, S. C.; A. T. Porcelius of Chattanooga, Tenn.; E. M. Foster of Greenville, Miss.; Frank Scwable of Clearwater, Fla.; H. P. Powell of Griffin, Ga., and C. L. Korner of Charlotte, N. C. W. F. Stieglitz of Columbia, who had been secretary-treasurer through almost the entire life of the Tri-State Association, was re-elected. Chattanooga, Tenn. was chosen for the 1925 convention.

Among the papers read was a description of the municipal water supply problems of Atlanta by Paul Norcross, and others by H. C. Woodfall and E. L. Filby, of the Georgia and South Carolina State Boards of Health, respectively. On Thursday afternoon the delegates visited the Atlanta waterworks plant. A banquet and entertainment were provided for the evening.

NEW JERSEY SEWAGE WORKS ASSOCIATION

The annual meeting of this association was held on April 25 at Trenton. Dr. William Rudolfs told of the work done during the past year at the New Jersey sewage experiment station. The Imhoff tanks at the Plainfield treatment plant foamed again last year, due to a change in method of operation and this gave an opportunity to study this phenomenon. It was learned, among other things, that foaming was accompanied by an enormous increase of fauna in the tank.

Settling tanks and separate sludge digestion were the subjects of a paper by W. D. Vosbury, who compared one-story, Travis, Imhoff, and Kremer-Kusch tanks. He stated combining mechanical sedimentation and biological digestion in the same tank resulted in interference of each process with the other which decreased the efficiency of both. He found that poor results in many tanks, however, were due largely to unsatisfactory operation.

H. M. Beaumont, assistant engineer of the Bureau of Surveys of Philadelphia, gave a description of the sewage treatment plans of that city, which include the construction of three large treatment plants.

The expanding of the association into a national organization was advocated, and a committee was appointed to report next year on the advisability of changing the name to the "American Sewage Works Association." The New Jersey association now has members in ten states. The committee appointed consists of S. Fisher Miller, H. A. Croft, and Myron E. Fuller.

REGIONAL TRAFFIC CONFERENCE

One hundred and fourteen cities and organizations of New York, New Jersey and Connecticut, within a radius of fifty miles of New York City, have already appointed 430 delegates to the regional traffic conference which will be held in New York City May 20th on the joint call of 13 organizations, including the Merchants' Association of New York, the New Jersey State Chamber of Commerce, the New Jersey League of Municipalities, the New York State Chamber of Commerce, the Westchester County Chamber of Commerce, the Brooklyn Chamber of Commerce, and 7 others.

Following the conference, the mayors of cities and the presidents of villages will be dinner guests of the Committee on Regional Plan of New York and Its Environs. This will be the first occasion on which the chief executives of the 273 municipalities in this region will come together to discuss their common problems. Lieutenant Governor George R. Lunn will represent the State at this dinner and at the traffic conference during the day.

More than 900 civic associations also have been asked to send the chairmen of their traffic, accident-prevention and city planning committees, to the conference. The acceptances already received indicate that more than 1,000 persons will participate in the deliberations which may lead to a solution of the traffic congestion, traffic accident and traffic cost problems.

The conference will consider particularly how the traffic problems of New York and the network of municipalities surrounding it are influenced by the heights of buildings, by zoning regulations, by the location of inter-city highways, and the extent to which these problems may be alleviated or eliminated by a plan for the future development of the 5,500 square miles in New York State, New Jersey and Connecticut, which is now generally recognized as constituting the Region of New York.

NEW YORK SECTION, A. W. W. A.

This section held its last spring meeting on April 28 at Binghamton, N. Y., at which the filtration system of the city was described by State Chairman Bert Nelson, and H. M. Beardsley, general manager of the Elmira water department, spoke on the taxation of water properties. Both of these were discussed by those present. After luncheon there was an automobile ride to the pumping station, filter plant and reservoirs of Binghamton and the pumping plants of Johnson City and Endicott. At the last named city those present inspected the water supply system of the Endicott-Johnson factories.

AMERICAN WATERWORKS ASSOCIATION

The program of the 44th annual convention of the American Waterworks Association, which meets in New York City May 19th to 23rd at the Hotel Astor, is given officially as follows:

On Monday afternoon the registration office will be open, and there will be meetings of the Executive Committee and of such standing and special committees as may be called by their respective chairmen. In addition there will be meetings to discuss the following subjects: "Procedures for improving facilities for superintendents to discuss general operating topics for inclusion in proposed Manual of Waterworks Practice." "Procedures for effecting closer relations between waterworks and fire protection men." "Program for cooperative work of American Waterworks Association with American Public Health Association in preparation for joint publication of new edition of Standard Methods of Water Analysis." "Procedure for secur-

ing needed operating data for use of Committee No. 3 on Practicable Loadings for Purification Processes." "Advances in colloid chemistry in relation to water purification." "Program for trying out new suggestions for essential data for water records and reports." "Work by proposed committee on purification of boiler water."

At 6:30 there will be a testimonial dinner for members and guests in honor of J. M. Diven, who retires as secretary after twenty-two years of service. This will be followed at 9:30 by a reception and dance given by the Waterworks Manufacturers Association.

TUESDAY SESSIONS.

9:00 A.M.—Opening of the convention, with announcement of officers elected, reports of Executive Committee and committees on private fire protection services, standard specifications for water meters, standard form of contract, and of the joint committee on electrolysis. A paper on "Allocation of Water Supply Derived from Watersheds of Interstate Streams," by L. P. Wood, and one on "Iodine Treatment of the Rochester Water Supply," by Beekman C. Little.

In the afternoon, beginning at 2 P.M., there will be, in addition to the regular session, one by the Chemical and Bacteriological section. At the former there will be papers entitled "The Method of Making Flow Tests and Their Value to the Waterworks Engineer," by George W. Booth; "The Relation of Fire Protection Requirements to the Distribution System of Small Towns," by Clarence Goldsmith; and "The Economic Significance of the Fire Waste," by Franklin H. Wentworth. Also general discussions of fire protection based on papers by V. B. Siems, published in the January Journal of the Society, and one by Louis Stocklmeir published in the May issue.

At the same time the Chemical and Bacteriological Section will listen to a progress report of the "Committee on Standard Methods of Water Analysis," presented by Jack J. Hinman, Jr., and the following papers: "A Defect in Permanent Color Standards Due to Variations in Cobalt Chloride," by M. C. Whipple; "Color Transmittency Curve of Some of the Colorimetric Standards including Cobalt Chlorides," by A. M. Buswell; "Micro Dissolved Oxygen Apparatus," by A. M. Buswell; "Notes on the Use of Dyes in Agar Media," by Max Levine; "Use of Gentian Violet Broth," by Jack J. Hinman, Jr.; "A Note on the Voges Proskauer Reaction," by Max Levine; and "Organization and Program of Sewage Investigations by the New Jersey Agricultural Experiment Station and the State Department of Health," by William Rudolfs.

At 5 o'clock all of the members will meet for election of members of the Nominating Committee.

Beginning at 8 P.M., papers by the Waterworks Manufacturers Association will be read, including: "The Development and Manufacture of Engineering and Surveying Instruments," by W. L. Egy; "Progress in the Chemistry of Precipitation and Coagulation," by H. M. Spencer; "The Development and Manufacture of the Modern Cement-Lined Service Pipe," by Reeves J. Newsom; and "Observations on the Chlorination of Small Water Supplies," by M. J. Tiernan. The first and last of these will be illustrated by lantern slides.

WEDNESDAY SESSIONS.

At the morning session the final report of the Standardization Committee on Sanitary Fountains, S. T. Powell chairman, will be read, and that of the Committee on Standards for satisfactory Drinking Water, by Allan W. Freeman chairman. W. F. Draper will read a paper, "Administration Interpretation of New Government Standards," and George C. Whipple one on "Government Relations and Professional Standards."

At 12 o'clock, as a special order of business, the place for holding the 1925 convention will be selected.

At 2 P.M. a paper entitled "Large Water Supply Mains" will be read by Dabney H. Maury. This will be followed by a topical discussion of the subject "The Most Interesting Experience Which I Have Recently Encountered in Waterworks Operation."

Meantime the Chemical and Bacteriological sections will discuss reports of the committees on "Filter Sand Testing and Recording" by Paul Hansen, and on "Practicable Loadings for Purification Processes" by Edward E. Wall; and a topical discussion on "The Most Interesting Experience Which I Have Recently Encountered in Water Treatment."

On Wednesday evening the Waterworks Manufacturers Association will give a smoker and entertainment to the men and a theatre party to the ladies. There will be a meeting of the American Society of Civil Engineers at 7:45, and this time is left open for those who wish to attend.

THURSDAY SESSIONS.

Beginning at 9 A.M., Thaddeus Merriam will read a paper entitled "Arrangement for Preventing Pollution of the Catskill Water Supply"; W. L. Stevenson, as chairman of Committee No. 5, will report on "Watershed Protection"; A. L. Fales, as chairman of Committee No. 6, on "Industrial Wastes in Relation to Water Supply," and T. H. Wiggin, as chairman of Committee No. 12, on "Testing of Waterworks Materials and Supplies."

In the afternoon there will be a boat trip up the Hudson River with a dinner at Bear Mountain Inn, given by the Waterworks Manufacturers Association.

FRIDAY SESSIONS.

Beginning at 9 A.M. papers will be read by Wellington Donaldson on "Action of Water on Service Pipe"; one by J. M. Diven on "Standardization of Services"; and Leonard A. Day, chairman of Committee No. 7, will report on "Pumping Station Betterments." These will be followed by discussions of a number of papers on pumping station practice which have appeared in recent issues of the Journal, to be followed by a paper by P. deW. Vosbury on "Operating Experiences and Economy of a Diesel Engine-Driven Pumping Station." If time is available, discussions will be held on questions from the question box.

In the afternoon, beginning at 2 o'clock, will be superintendents session, at which W. S. Cramer will read a paper entitled "Keeping an Antiquated Plant in Tune"; R. B. Champion one entitled "A New Well System at Holland, Mich.," and Scotland G. Highland, "Weather Bureau Data at Pumping Stations." These will be followed by additional discussions of questions from the question box.

In the meantime the Chemical and Bacteriological Section will, at its morning session, listen to papers by S. B. Applebaum on "Proper Zeolites for Water Softening," and one by A. S. Behrman on "The Early History of Zeolites." The section will then discuss the adoption of a program in connection with the preparation, jointly with the American Public Health Association, of the revised Standard Methods of Water Analysis. In the afternoon session there will be a conference of abstractors to formulate plan and scope of work for the ensuing year, a conference of the Standardization Council, and one of the Publication Committee.

AMERICAN SOCIETY OF CIVIL ENGINEERS

The program of the 54th convention, to be held at Pasadena, Cal., June 18 to 21, has been announced. An address by Franklin Thomas, president of the Los Angeles Section, one by Governor F. W. Richardson, and the annual address of the president, C. E. Grunsky, will be followed by a 25-mile automobile ride to points of interest, ending in a garden party.

On June 19, at the morning session, there will be a discussion of a paper by Col. William Kelly on "The Colorado River Problem." During the afternoon there will be simultaneous meetings of representatives of local sections and technical divisions, followed by an automobile ride to the Thomas H. Ince studios at Culver City.

On June 20 there will be an all-day excursion to Los Angeles harbor and Catalina Island.

On June 21 another excursion will be taken to the tri-cities sewage disposal plant, the Los Angeles outfall sewer and screening plant, and the Weid Canyon dam.

On April 23rd this society joined with the three other national engineering societies in awarding the John Fritz medal to Ambrose Swasey.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

FOGARTY DIGGING BUCKET

Fogarty Excavating Appliances, Inc. Rochester, N. Y., is building and marketing the Fogarty digging bucket, a trenching tool, designed by an experienced operator to dig in hard materials such as indurated clay, shale, hard-pan and blasted rock.

The Fogarty digging bucket is a powerful excavator absolutely under the control of the operator. It is built of cast steel on the lines of a clamshell except that it is fastened by a rotating head to the end of a steel operating arm set in the boom socket. The closing line leads over the end of this arm to the closing sheaves and all the power increased by four or five reevings is back of the bite without any closing line "lift" of the ordinary clam. When placed to dig on hard ground, it must bite a load or stall the power. A straight side or sloping trench of any width can be dug, with the machine resting on solid ground, and because of the long bucket arms it operates successfully in a sheeted trench.

It can be attached to any standard two-drum crane, convertible shovel or A-frame traveler, with the operating arm built of a length suitable to the balance and capacity of the machine. The bucket is made in the standard sizes and when not in use for difficult digging can be quickly converted into a two-line clam.

For trench excavation, the manufacturers claim it will dig a wider and deeper trench in harder material with better control of its operation than the usual equipment for this class of work and that the cost of excavating is reduced because of the certainty of a good load with each bite.

EASY-ON PIPE COUPLINGS

Pipe couplings and tees are manufactured by George H. Snell of Attleboro, Mass., devised by him while superintendent of the Attleboro Water Department, where, during his fourteen years of service, he had a great deal of trouble with electrolysis on service pipes and mains, necessitating many repairs. The result of his studies was a coupling and tee as shown in the accompanying illustration. In making these couplings no threads have to be cut and the pipe does not necessarily have to be in true alignment. To install them it is necessary only to cut out a piece of pipe where there is a leak and substitute the coupling for the piece removed. Tees for carrying off branch lines can be inserted in the same way. These couplings are used for pipes from 2 inches down to 3/4-inch—that is, chiefly for service pipes. The joint between pipe and couplings is made by means of a specially prepared rubber gasket. After slipping the coupling in place it is only necessary to screw up two nuts to make the joint watertight.

FOGARTY DIGGING BUCKET.

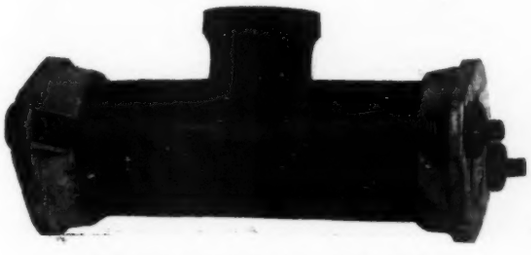
ELECTRIC METER SERVICE SWITCH

A new electric meter service switch with a safety locking feature has been designed by the Westinghouse Electric & Manufacturing Company for use in connection with meters placed by central stations in the plants or houses of their customers. The aim is to make impossible theft of current or tampering with the meter switch. The main cover of the switch is hinged at the lower end of the switch cabinet and is equipped with a sealing slot in the upper right-hand side for wire or strap seals. The face of the cover contains a horizontal sliding steel shutter through which the service fuses are accessible to the user, this shutter being controlled by an interlocking device which makes it possible to open the fuse compartment only when the service control handle is in the "off" position and prevents closing the switch while this enclosure is open. Brackets on the outside of the switch cover provide for locking the service control handle in either the "off" or "on" position.

LOCKED CISTERN TOPS

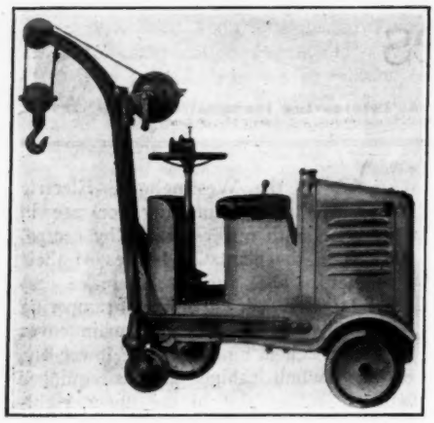
The H. W. Clark Company of Mattoon, Ill., is manufacturing what it calls the "Yaeche Locked Cistern Top" for use in connection with cisterns, cesspools and vaults, the special feature of which is that it can be locked. It can also be used for coal holes and any other similar circular openings of 20 inches diameter, which is the standard size adopted for these tops.

The advantage claimed in the locked top is that in the case of cisterns it prevents pollution of water by dirt entering through a loose or removed cover, while it is said that many children have lost their lives by falling into cisterns, cesspools, etc., the covers of which were loose, and other casualties have occurred.



TEE WITH "EASY-ON" COUPLINGS.

YAECHE LOCKED CISTERN TOP



THE CLARK "DUAT"

The "Duat," said to be the smallest industrial truck and tractor built, has just been announced by the Clark Tructractor Co. of Buchanan, Mich. It is a 3-wheel gasoline mobile crane, truck and tractor. Pivoting on one wheel, it has a turning radius of 52 inches. It can tow seven to ten tons on a factory floor or yard. The crane, which will lift and carry up to 2,000 lbs., can be attached or detached in less than five minutes.

MARTIN TRACTOR SHOVEL

Light weight, low cost, economy, speed, maximum strength and dependability, and absence of friction, were the aim and are the claim of the designers of the Martin tractor shovel, manufactured by the Universal Machine & Equipment Co. of Greensburg, Pa. This shovel is said to have climbed a 40 per cent. grade, broken up 12 in. of frozen ground, successfully handled shallow grading in road work, loaded loose material, excavated for buildings, etc.

The power plant is mounted on the tread, to which it transmits power by a chain drive. The shovel operating mechanism is a self-contained unit mounted on a revolving turret which rotates in a full circle on heavy ball and roller bearings, supported by a mast rigidly mounted on the tread. The operator, who always faces the bucket, can use the full power of the motor on the hoisting cables, or can hoist, crowd, and swing in either direction at the same time.

The shovel can be crowded by means of an hydraulic cylinder, the liquid being supplied by a rotary pump capable of producing pressure up to 250 lbs. per square inch. In addition, the shovel has the digging cable carried over a set of sheaves and attached to the free end of the bucket handle, so that the pull of the digging cable can be used for crowding, making the hydraulic thrust unnecessary and thus saving power.

The hoisting drum is tapered, to increase the cable pull when the bucket is digging at the bottom of the cut, and increase the speed when it is being hoisted into dumping position. All gears and bearings are enclosed and run in oil. The maximum digging radius is 20 ft., the dumping radius 17 ft. and the dumping height 15 ft. The total weight is 8 tons. The overall width of tread is 8 ft. The average capacity is 20 to 40 cu. yds. per hour.

TRENCH PULL SHOVEL

The Northwest Engineering Company of Chicago, manufactures what it calls a trench pull shovel, which it claims combines the advantage of the dragline (in that it backs away from its work) with the digging ability of the power shovel.

The shovel is driven by a gasoline motor and is mounted on crawler treads and is highly mobile. As it backs away from its work it is always on firm ground and never has to straddle the trench. It is steered and operated by one man from the cab. On sewer work it digs a square, even sided ditch, slightly wider than its dipper, which comes in sizes of 22, 33 and 42 inches. It has a long reach and it is claimed that it will dig any depth up to 16 feet and deposit on spoil banks with the same ease as a standard shovel.

By a change of booms it can be converted to a dragline in a few hours. If desired, it can be changed to a crane by the use of the dragline boom; and with still another change and an additional boom it can be made into a standard shovel. The machine can be moved from job to job very readily, as it will travel and load itself on a flat car under its own power, and can be shipped without dismantling.

"WON-WAY" ARROW

The Century Sign Company of Boston, Mass., is furnishing a device, which is now being installed in Boston after a trial of six months, for indicating one-way streets. The device is provided with means for avoiding damage to the sign, this being such as to permit the arrow to swivel or turn to one side when hit, and resume its normal position when the vehicle striking it has passed. It had been found that, because one-way traffic arrows are necessarily placed at curb corners, a fixed arrow is very apt to come to grief. The Company states that the six-months' trial of this arrow in Boston showed it to be almost damage-proof, while fixed arrows had been demolished on an average of one every ten days.

"SIMPLICITY SCREENS"

What is known as the "Simplicity Oilless" Screen is made by the Simplicity Engineering Co., of Gladwin. Mich. It is of the vibratory and shaker type, eccentrics vibrating the screens both horizontally and vertically. This keeps the pebbles constantly hopping and rubbing against each other and cleans them thoroughly, the fine material removed passing through the screen. This permits using a finer mesh screen than would otherwise be permissible and thus saving the fine pebbles.

The machine is constructed of steel and iron throughout, is light in weight and portable. The vibrators and bearings are said to require oiling and adjustment but once a year. Any system of elevating raw material can be used—continuous bucket line, belt conveyor or hopper feed.

TRENCH PULL SHOVEL.

NEW CATALOGS

(If you want any of these catalogs send the number with your name and address to PUBLIC WORKS and it will be sent to you promptly without charge or obligation.)

WATER TANKS

704. The Pittsburgh-Des Moines Steel Company, of the two cities named, in a pamphlet "Steel Water Tanks for Public Service" describes the purposes of water tanks and gives illustrations of a number of those that they have built. 24 pages. 5½ x 8½.

ELASTITE JOINTS

705. The Philip Carey Company of Cincinnati, Ohio, presents a complete catalogue of the Carey elastite expansion joint with physical and chemical description, numerous illustrated examples of use for streets, sidewalks, curbs and gutters, bridges, reservoirs and elsewhere. 70 pages. 8½x10½.

SAND BLAST APPARATUS

706. L. O. Koven & Brother of Jersey City, N. J., describes the Hoevel Sand Blast Machines manufactured by them and gives instructions for use in a small pamphlet. 16 pages. 3½x6.

WITTE ENGINES

707. The Witte Engine Works of Kansas City, Mo., describes the Witte Throttle Governor Engine, an internal combustion suitable for concrete mixers and other contracting requirements. 8 pages. 6½x8½.

OBERLIN ROAD MACHINERY

708. The Oberlin Machinery Company of Oberlin, Ohio, describes road graders, scrapers and drags. 8 pages. 6x9.

BOSS CONCRETE MIXER

709. The American Cement Machine Company of Keokuk, Ia., describes tilting mixers manufactured by it of various capacities up to size 7 and mounted on two or four wheels. 8 pages. 8½x11.

REFUSE WAGONS

710. The Convertible Wagon Trailer Company of Buffalo, N. Y., issues two pamphlets—"Rear Dump Wagons for Refuse Collectors" and "Convertible Wagon Trailer" for refuse haulage. Illustrated catalogues. 20 pages. 8½x11.

HIGHWAY LINE MARKER

711. The Line-O-Graph Company of New York City describes an appliance for painting lines on the highways for safety zones, traffic regulation, etc. 8 pages. 3½x8½.

AIR MAPS

712. The Air Map Corporation of America, of New York City, describes its services in making air maps of cities and larger areas to be used for various purposes. 16 pages. 3¼x6¼.

POWER LAWN MOWERS

713. The Ideal Power Lawnmower Company of Lansing, Mich., describes power lawnmowers of various sizes for parks, golf clubs, etc. 4 pages. 8x10½.

FRAZIER HOIST

714. The Naperville Machine Company of Naperville, Ill., describes a truck hoist operated from the driver's seat. 2 pages. 8x11.

In the Dead of Night

In the dead of night a fire breaks out—the alarm must be given. A child is taken sick—the doctor must be called. A thief enters the home—the police must be located.

In the dead of night the American turns to his telephone, confident he will find it ready for the emergency. He knows that telephone exchanges are open always, the operators at their switchboards, the wires ready to vibrate with his words. He has only to lift the receiver from its hook to hear that calm, prompt "Number, please." The constant availability of his telephone gives him security, and makes his life more effective in wider horizons.

Twenty-four-hour service, which is the standard set by the Bell System, is the exception in the service of Continental Europe. An emergency may occur at any time. Continuous and reliable service has become a part of the social and economic fibre of American life.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

HISTORY OF PETROLEUM

715. The Tidewater Oil Sales Corporation of New York in a finely gotten-up pamphlet, "An Unusual History of Petroleum," gives interesting information combined with amusing comments. 28 pages. 12x9.

GODER INCINERATORS

716. The Goder Incinerator Corporation of Chicago produces a pamphlet describing refuse incinerators of various sizes, from those suitable for apartment houses to those used for cities. 16 pages. 8½x10½.

CENTRIFUGAL BLOWERS

717. The DeLaval Steam Turbine Company of Trenton, N. J., in a pamphlet entitled, "Centrifugal Compressors," describes compressors and blowers for pressures up to 125 pounds.

CURING CONCRETE

718. The Dow Chemical Company of Midland, Mich., describes the curing of concrete by use of "Dowflake" calcium chloride. 16 pages. 5¼::7½.

Screen No. 3 has a length over all of 11 ft., width of 4 ft. 6 in., height, 16 ft. The screen surfaces are 18½ sq. ft. for the oversize and 36 sq. ft. for the sand screen. The vibrators are mounted on large Timken roller bearings. The power is a Novo 7-9 h.p. gasoline motor. All transmission is by belts. The capacity is claimed to be 50 cu. yds. per hour.

The Simplicity Screen Junior has a capacity of 25 cu. yds. per hour; the screens have areas of 10 sq. ft. and 18 sq. ft. respectively. A rubber conveyor belt 14 in. wide and 24 ft. long, which folds in the middle when moving the equipment, is furnished. Otherwise it is practically the same as No. 3.

THE DENISON POWERMAKER

The Cook Motor Company, of Delaware, Ohio, manufactures a vertical, inverted 2-cylinder, 4-stroke cycle engine for furnishing power which it calls the "Powermaker." It is built standard for power take-off on the crank shaft at the flywheel end, but power can be taken off, from the opposite end if necessary. It has a 4⅛ in. bore with a 4½ in. stroke and develops 10 h. p. at 1,000 r. p. m. on the crank shaft, or 500 r. p. m. from the gear reduction shaft.

The aim has been to design a power unit heavier than the automotive type, but light enough to be portable, that will withstand hard usage and abuse, will be reasonable in first cost and economical in operation, any part of which can be adjusted or replaced quickly by a novice.

TANDEM PAVING ROLLER

The Erie Machine Shops of Erie, Pa., has just completed and tested out something new in tanden rollers, which it offers as a substitute for the ordinary gasoline type; this roller using for power a Baker engine, either rotary steam or oil burner. One of the essentials of a good roller for asphalt work is ability to reverse the roller instantly and so avoid hard spots in the asphalt. The manufacturers state that the engine used is an application of high pressure steam made possible by the Baker valve; that it is a rotary confined steam engine having no dead centers and has great starting torque. The valve will operate any number of cylinders up to twenty-four. While operating 600 pounds steam pressure it can be thrown into reverse with one finger applied to a 10-inch lever. There are only three moving parts and there is no valve gearing. The Baker oil burner is claimed to afford complete combustion and absolutely no noise or carbon trouble.

ERSTED "HYSTERS"

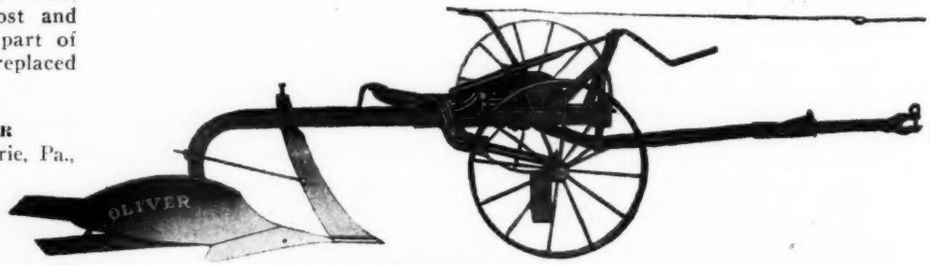
The Ersted Machinery Manufacturing Co., of Portland, Oregon, is manufacturing a hoist attachment for the Fordson tractor which is made in six models, including both single and double drum. It is attached to the Fordson by channels which are bolted to ends of a special radiator bottom tank and to the transmission housing flange. These carry a main casting in which the Hyster is entirely contained. The drive shaft is belt-driven from the Fordson pulley. The hoist drum has a cable capacity of over 500 ft. of ½-in. wire rope. The full pulling power is 5,000 lbs., at 135 ft. a minute, and the haul-back drum 2,000 lbs, at 300 ft. The operation is fully controlled from the driver's seat.

Different models are furnished for stump pulling, pile driving, drag-line scrapers, etc.

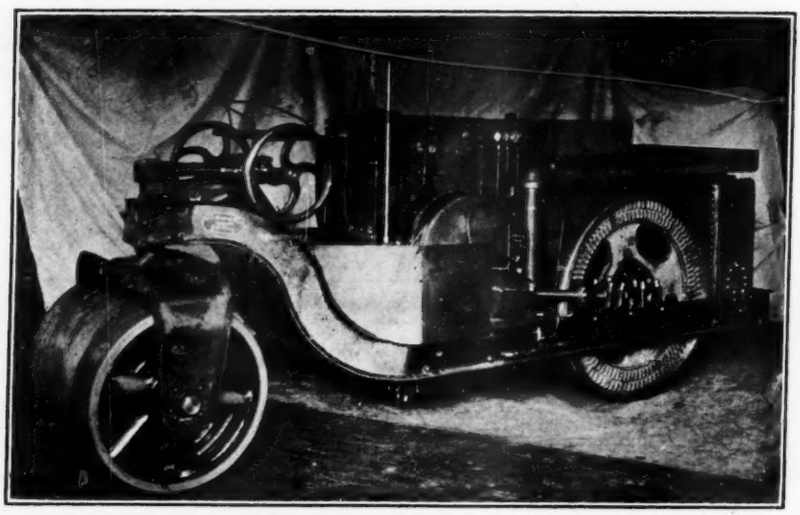
STEEL CURRENT RETARDS

In our issue of March, 1923, we described the use of Bignell piles as anchorage for current retards by the Woods Brothers Construction Co., of Lincoln, Neb. This company has developed a system of retards for both navigable streams and smaller ones. For the latter it offers steel current retards. A standard unit is fabricated of 3 x 3 x ⅜ in. steel angles 12 ft. long. It sits upright on the river bed and is interlaced with galvanized steel cable that, while strengthening it, also provides an entanglement to catch floating drift. Also the entire up-stream face is covered with a heavy wire mesh. A retard is composed of one or more of such units, built out from the bank into the stream. As anchorage, a ½ in. galvanized steel cable is carried from each unit upstream 50 to 150 ft. to a large deadman.

A thickly compacted mass of trees is placed below the entire length of the retard to assist in retarding the current and encourage deposits, a large mass of trees being anchored at the shore end to prevent the current washing around it.



OLIVER PAVEMENT PLOW



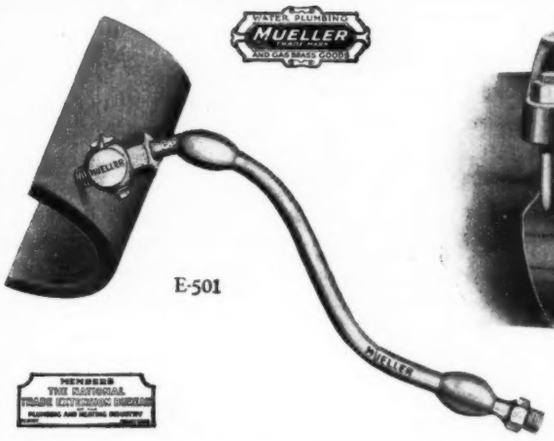
ERIE TANDEM PAVING ROLLER

OLIVER ROAD-BUILDING EQUIPMENT

Road-building equipment manufactured by the Oliver Chilled Plow Works of South Bend, Ind., includes grading and pavement plows, road plows, ditchers and disc harrows. The road plow is claimed to be an unusually strong and heavy-duty plow for putting the soil in condition for working. Among the special features are a simple power lift, standing coulter, thorough bracing for strength and a bottom particularly adapted to this type of work. It can be operated with one man and a tractor.

ELECTRIC FLASHING HIGHWAY SIGNAL

The Adlake Electric Flashing Highway Signal was developed by the Adams & Westlake Co. of Chicago to meet the necessity of that city for a traffic signal combining economy of installation, econ-



E-751
[Patented]

What the Name MUELLER Means to Water Works

Water Works Companies all over the United States recognize that the name Mueller stands for absolutely dependable goods—fair prices—courteous treatment—and prompt deliveries.

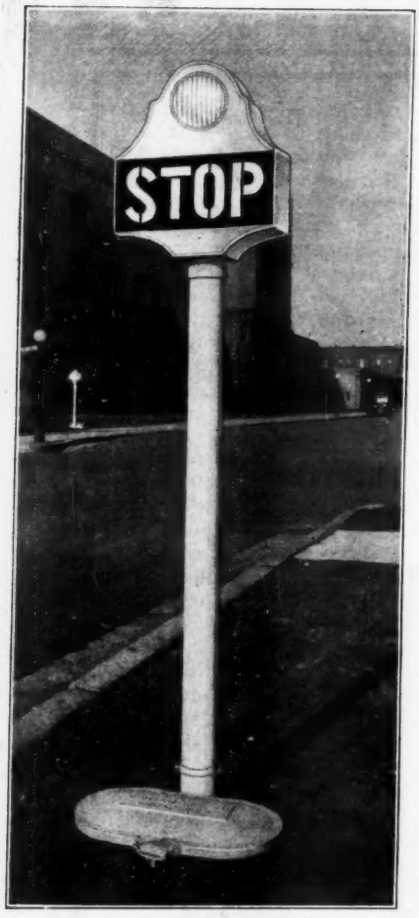
Whether you need Mueller Wiped Joint Goose Necks (No. E-501)—Mueller Improved Service Boxes (No. E-751)—or Mueller Curb Stops (No. E-557)—shown here—or any of the many other Mueller Brass Goods—the name Mueller is a pledge of quality and a guarantee of service.

Mueller Goods save money and make money for Water Works Companies—because they outlast all others.

These and many other Mueller products of interest to Water Works Companies may be seen at the Mueller Display Booth at the A.W.W.A. Convention at the Hotel Astor, New York, May 19--24. Our representatives will be glad to give you details, and to quote prices.

Mueller Co., Decatur, Ill., U. S. A.

145-149 W. 30th St., New York; 1072-76 Howard St., San Francisco; 2468 Hunter St., Los Angeles



ADLAKE ELECTRIC SIGNAL

omy of maintenance and genuine dependability. The first two were important because of the thousands of units needed by the city.

This signal uses standard time-tested equipment, readily installed and requiring very little attention. It consists of a light standard having in the base a compartment for holding a number of Edison primary 4-cell batteries and a flasher relay. This is set so that the top of this compartment is about level with the surface of the ground. No wire connections or underground conduits are necessary—the device is entirely self-contained. It can be set anywhere, or its position changed with very little trouble or expense.

By means of a specially designed reflector the light from a one-candlepower bulb is amplified 400 times and is said to be readily discernible several blocks away. The flashes use less than one per cent of the energy required to light the filament, and it is claimed that under ordinary circumstances one set of batteries will run the signal for 18 to 24 months, no attention being required meantime except possibly painting exposed parts.

The unit being self-contained, a small community can put in ten as readily as a large one can a thousand, and each unit can start working as soon as it is set in place, without waiting for the completion of the entire system, with its wiring.

LUMNITE CEMENT

The Atlas Aluminate Cement Company of New York City announce that, after several months of experimental manufacture, it is now prepared to produce an alumina cement, to which it gives the name of "Lumnite," at its plant at Northampton, Pa., in quantities to meet any demand.

This cement is manufactured from materials of which bauxite constitutes a large part, the chemical composition of the cement being approximately 40% alumina, 40% lime, 15% iron oxides and 5% silica, magnesium, etc. It is manufactured in much the same way as Portland cement but is ground much finer. It is a hydraulic cement possessing the desirable qualities of Portland cement and, while it is not quick-setting, giving plenty of time for mixing and placing, when it begins to set does so very rapidly and within 24 hours develops a strength somewhat greater than Portland cement at 28 days. This company has acquired the Spackman patents which cover, in this country, the manufacture of all high alumina cements.

The cement is recommended especially for foundations of streets, pavements, etc., where it is desirable not to hold up traffic any longer than necessary, and for bridges and other structures where it is of advantage to be able to remove the forms in twenty-four to forty-eight hours; and for other structures where the advantage of placing the concrete in service within two days compensates for the somewhat greater cost of the cement.

INDUSTRIAL NOTES

ATLAS POWDER COMPANY ADDRESS.

The Atlas Powder Company, maker of ammite, coalites and other explosives, announces the removal of its New York office to the Park-Lexington Bldg., Park Ave. and 46th St., New York.

FILTROS PLATES FOR CHICAGO

Contract has been awarded to the General Filtration Company, Inc., of Rochester, N. Y., for 54,000 filtros plates 12 inches square by 1½ inches thick, to be installed in the North Side sewage treatment works of the Chicago Sanitary district—a plant which will treat the sewage of approximately one million people.

DOCK AND TERMINAL ENGINEERING COMPANY

The Dock and Terminal Engineering Company has acquired the engineering business formerly conducted by the Cleveland Dock Engineering Company. The personnel of the new company includes Gaylord W. Feaga, president; Joseph S. Ruble, vice-president; James D. Carey, secretary; Edgar B. Thomas, chief engineer, and Wilbur J. Watson, consulting engineer. The firm will specialize in docks, piers, wharves and warehousing and freight-handling facilities, serving as consultants, designing engineers and project engineers. Its offices will be at 15 Park Row, New York City and 4616 Prospect Avenue, Cleveland.

WESTINGHOUSE PITTSBURGH OFFICE

New offices for the Pittsburgh sales organizations of the Westinghouse Electric & Manufacturing Company and the Westinghouse Lamp Company have recently been opened on the fourteenth floor of the Chamber of Commerce Building. J. McA. Duncan is in charge of this office, which serves parts of Pennsylvania, West Virginia and Ohio. In addition, Barton Stevenson will be in charge of the Central Station Division of the new office; F. G. Hickling is manager of the Transportation Division; Carl D. Taylor is manager of the Industrial Division and F. C. Albrecht is head of the Merchandising Division.

HIGHWAY LIGHTHOUSE COMPANY

F. H. Lawson has just been appointed manager for the Texas district of the Highway Lighthouse Company, with headquarters in the American Exchange Bank Building at Dallas, Tex. Mr. Lawson was recently state representative of the W. O. Specialties Company of Detroit and formerly business manager of the Daily News of Tacoma.

WAREHOUSE TRANSPORTATION

The General Motors Truck Company of Pontiac, Mich., has prepared for free distribution a booklet entitled, "Warehouse Transportation," which contains data on tractor-truck and trailer transportation, selection of bodies, operating costs, federal and state legislation and other points of interest to warehouse men.

The Company also has announced that on May 15th Otto E. Stoll, who for several years has been vice-president of the Company, will be transferred to the Home Office with the duties of general manager, taking over a part of the present duties of W. L. Day, who at present is president and general manager.

THE PARADON ENGINEERING COMPANY

The Paradon Engineering Company of Long Island City, New York, has been organized to manufacture chlorine control apparatus for all purposes, including water and sewage purification The organizers are Richard V. Donnelly, who has resigned as manager of sanitary sales for the Wallace & Tiernan Company; Howard Pardee, formerly assistant production manager for the same company; and S. Pincus, for seven and a half years sanitary engineer with the United States Public Health Service.

NEWS OF THE SOCIETIES

CALENDAR

June 23-28—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting at Chalfonte-Haddon Hall, Atlantic City, N. J.

June 25-28—SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Annual meeting at Boulder, Colo.

Sept.—CITY MANAGERS' ASSOCIATION. Eleventh annual convention, Montreal, Que., Can. Executive secretary, John G. Stutz, Lawrence, Kan.

Sept. 15-18—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention, Topeka, Kan. (Tentative date). Secretary, R. D. Morgan, Mexia, Tex.

Sept. 30-Oct. 1-3—NEW ENGLAND WATER WORKS ASSOCIATION. Annual convention at Powers Hotel, Rochester, N. Y. Secretary, Frank J. Gifford, Boston, Mass.

Sept. 29-Oct. 3—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention at Hotel Copley Plaza, Boston, Mass.

Oct. 14-17—NATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Partridge Inn, Augusta, Ga. Secretary, William R. Arbuckle, supt. fire alarm, Bayonne, N. J.

Nov. 17-19—ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting at San Francisco.

November—NORTH CAROLINA SECTION, AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Charlotte, N. C. Secretary, Thorndike Saville, University of North Carolina, Chapel Hill, N. C.

SANITARY CONFERENCE

Under the auspices of the British Institute of Sanitary Engineers an international conference of sanitary engineers is to be held in London, England, during the week beginning July 7. A number of American engineers will be present and participate, the following having already been announced: W. C. Groeninger, John A. Wilson, Prof. George C. Whipple, T. Chalkley Hatton, Harrison P. Eddy, Charles H. Hurd, Langdon Pearse, Victor A. Kadish, John C. McVea, W. L. Stevenson and Thomas J. Classy.

ENGINEERS SOCIETY OF PENNSYLVANIA

Officers of this society for the coming year have been elected as follows: President, Howard E. Moses of Harrisburg; vice-presidents, E. F. Entwisle of Steelton and David S. Hammond of Lebanon; secretary, Edward R. Dasher of Harrisburg, and treasurer, Basil M. Graham of Harrisburg.

AMERICAN SOCIETY FOR TESTING MATERIALS

The twenty-seventh annual meeting of this society will be held at Atlantic City June 24th to 27th. On the first day there will be a symposium on "Corrosion-Resistant, Heat-Resistant and Electrical-Resistant Alloys"; a discussion on "Coal, Timber, Rubber and Textiles"; and another on "Paints, Petroleum Products, Insulating Materials and Thermometers."

On the 25th one session will deal with "Non-Ferrous Metals, Corrosion and Metallography"; another on "Lime, Gypsum and Ceramics," the last including clay and cement sewer pipe and brick; and a business session with the annual report of the executive committee, committees on papers and publications, and annual address of the president.

On the 26th the sessions will deal with "Steel"; "Road and Paving Materials and Waterproofing," and "Methods of Testing and Nomenclature."

On the 27th the sessions will deal with "Magnetic Analyses and Fatigue of Metals"; "Wrought and Cast Iron Pipe," and "Concrete and Reinforced Concrete."

NEW YORK SECTION, A. S. C. E.

At the meeting May 21 this section elected the following officers for the coming year: President, John P. H. Perry; vice-president, Lieut. Col. John R. Slattery; secretary, Harold M. Lewis; directors, Walter Spear and J. B. French. H. P. Hammond continues as treasurer.

BOSTON AFFILIATED TECHNICAL SOCIETIES

The Council of the Affiliated Technical Societies of Boston held its annual meeting at the Engineers Club on June 2nd. After the presentation of the annual reports of the treasurer and of the executive secretary the nominating committee presented its report, which was accepted, and the following were elected officers of the Council for the ensuing year:

Chairman, Frank M. Gunby.
Vice-Chairman, Frank S. Clark.
Vice-Chairman, Frederick M. Gibson.
Treasurer, Charles L. Hammond.
Clerk, Frank A. Marston.

Additional Members of Executive Committee, Frederic A. Eustis and Allen Hubbard.

A recommendation from the Boston Section, A. S. M. E., that the Affiliated Council appoint a special committee on Fuel and Fuel Economy was favorably considered. Frederick M. Gibson was appointed chairman of this new committee, which is to consist of five members.

A communication from the Boston Chapter, A. A. E., with reference to the proposed new commission to study the water supply needs of the Metropolitan District and other communities was referred to the executive committee.

NEW ENGLAND WATER WORKS ASSOCIATION

The date of the annual convention has been changed from Sept. 23-26 to Sept. 30 and Oct. 1 to 3. An outing will be held at Plymouth, Mass., on June 25, with headquarters at the Hospitality Hall of the Plymouth Cordage Company. Shore dinner at 1:45, golf and sightseeing.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The regular Nominating Committee of this society has presented the following nominees. The ballots will close on Sept. 23rd. For president—Prof. William F. Durand, Stanford University; vice-presidents—Prof. Robert Angus, University of Toronto; S. F. Jeter, chief engineer of the Hartford Steam Boiler Inspection & Insurance Company; and Thomas L. Wilkinson, consulting engineer. For managers—John H. Lawrence, engineering manager, Thomas E. Murray, Inc.; Edward A. Mullor, vice-president and general manager, the King Machine Tool Company; and Paul Wright, of Paul Wright & Company. For treasurer—William H. Wiley, president, John Wiley & Sons.

CITY MANAGERS' ASSOCIATION

The Year Book for this Association is off the press, and will prove of undoubted value to all interested in city government. It contains the history of growth, development and success of the city manager plan and the city manager profession. Seven articles on city administration are contributed by city managers in Canada and New Zealand as well as in the United States. The Year Book contains the proceedings of the tenth annual convention of the City Managers Association held in Washington, D. C., also a directory of city manager cities, the names of their managers and the salaries paid, all as of March 15th, 1924.

AMERICAN SOCIETY OF CIVIL ENGINEERS

The first ballot for official nominees of the American Society of Civil Engineers has been canvassed by the tellers, with the following results:

Total number of ballots canvassed, 1,927.

For president—Robert Ridgway, 744; Leonard Metcalf, 379; I. W. McConnell, 193; scattering, 423.

For vice-president, Zone 2—Richard L. Humphrey, 207; John C. Hoyt, 204; John E. Greiner, 154; scattering, 63.

For vice-president, Zone 3—H. R. Safford, 177; Milo S. Ketchum, 113; Willard Beahan, 41; scattering, 61.

For director, District 1—W. T. Chevalier, 217; Charles Gilman, 215; James F. Sanborn, 23; scattering, 138.

For director, District 2—C. M. Spofford, 76; Caleb M. Saville, 56; scattering, 47.

For director, District 6—A. R. Raymer, 42; E. K. Morse, 37; C. P. Fortney, 8; scattering, 10.

For director, District 10—P. H. Norcross, 43; G. M. Braune, 34; scattering, 40.

For director, District 13—H. D. Dewell, 39; C. H. Sweetser, 5; scattering, 20.

Scattering are those who receive less than 50 per cent. of the total ballot.

PERSONALS

Cox, Charles R., formerly chief chemist of the Bureau of Water of Reading, Pa., is now assistant engineer of the New York State Department of Health.

Longley, Col. F. F., formerly of the staff of Hazen, Whipple & Fuller, and more recently specialist in sanitary and public health engineering in Europe for the League of Red Cross Societies and the Rockefeller Foundations and advisor on water supply and sewerage for Australia, has joined the personnel of the Lock Joint Pipe Company, to which he will give advice on water supply and sewerage problems.

Tolman, Mayo, formerly chief engineer of the West Virginia State Department of Health, is associated with Nicholas S. Hill, Jr., as sanitary engineer, with charge of his chemical and bacteriological laboratory.

Wise, Colin R., for 35 years city engineer of Passaic, N. J. and senior member of the firm of Wise & Watson, died May 19 after a short illness. He was in his 79th year.

Gavett, Andrew J., consulting engineer to the city of Plainfield, N. J., and for many years its engineer and street commissioner, died May 25. He was 71 years old.

Gwinn, Dow R., for 23 years with the Water Works Co. of Terre Haute, Ind., and for many years its president, and for 19 years previous with the Quincy, Ill., water works, has resigned the former position.

Lingenfelter, Frank C., has been appointed city engineer of Indianapolis, Ind.

McCombs, M. J., formerly chief of surveys of Dallas, Tex., has been appointed sanitary sewer engineer of that city.

Barnwell, R. H., has been appointed city engineer of Oceanside, Cal.

Brown, Charles, formerly city sewer engineer of Indianapolis, Ind., has resigned.

Boswell, David C., formerly resident engineer with the New Jersey State Highway Commission, has been appointed town engineer of Ridgefield Park, N. J.

McKesson, Claude L., formerly senior highway engineer with the U. S. Bureau of Public Roads, is now materials research engineer for the California State Highway Commission.

Sturdevant, W. C., has been appointed city engineer of Chehalis, Wash.

Flinn, Alfred D., director of Engineering Foundation, has been made an honorary member of the Masarykova Akademie Prace, of Prague.

Owen, Lewis R., has been re-elected borough engineer of Ferndale, Pa.

McBeath, J. B., formerly assistant city engineer of Moncton, N. B., has been appointed city engineer.

Drake, Edward, has been appointed city engineer and city manager of Ocala, Fla.

Dietrich, Edward, has been appointed city engineer of Tuscon, Ariz.

Sheets, Frank T., formerly superintendent of highways of Illinois, has been appointed chief highway engineer of the Division of Highways, succeeding Clifford Older. He will continue temporarily to perform the duties of superintendent of highways.

Page, J. M., formerly in charge of federal aid projects in eastern Texas for the Bureau of Public Roads, on March 17th assumed the office of state highway engineer of Oklahoma.

Popelka, Charles J., formerly city engineer of Two Rivers, Wis., has been appointed superintendent of streets at Beloit, Wis.

Schwartz, W. F., has been appointed commissioner of public works of Buffalo, N. Y.

Thomson, R. H., formerly city engineer of Seattle, Wash., has been appointed assistant to the county engineer of King County on the Green River deepening project.

Hudgins, F. D., has resigned as state highway engineer of South Dakota.

Walden, Albert E., has been appointed engineer of the metropolitan Sanitary district of Baltimore, which was created by a bill passed by the last legislature.

Pietzsch, L. R., has been appointed city manager of Beaumont, Tex. He has appointed R. M. Fulweiler as city engineer and the Terrell Bartlett Engineers, Inc., as consulting engineers to the city.

Patch, W. W., formerly division engineer with the California State Highway Commission, has resigned to engage in private practice.

Neeson, John H., for 17 years with the city government of Philadelphia, has been appointed chief of the Bureau of Highways of that city.

Strohmeyer, Joseph S., for 15 years with the city government of Baltimore, Md., has been appointed distribution engineer of the Water Department.

Dix, Thurman W., has been reappointed chief engineer of the Department of Highways of Vermont.

Carey, J. W., formerly assistant chief engineer of the State Department of Public Works of Washington, has been appointed chief engineer of that department, succeeding Herbert J. Flagg, who has resigned.

Wells, W. J., formerly with Roberts & Schaefer Co., has been appointed city engineer of Huntingburg, Ind.

Palmer, H. E., formerly highway engineer of Red Lake County, Minnesota, is now highway engineer for the Minnesota State Highway Department.

Willgoose, Arthur L., has been appointed office manager and cost engineer with the Department of Public Works of Teaneck, N. J.

U. S. CIVIL SERVICE EXAMINATIONS

Cartographic Draftsman. Applications received until June 24. To fill vacancy in office of chief of naval operations. Entrance salary, $1,860 a year; possible increase to $2,400. Required—graduation from high school and 3 years of field or office experience in surveying or engineering, each completed year in technical college course equivalent to 6 months of experience.

Physicist ($3,600 to $3,800), associate physicist ($3,000 to $3,600), and assistant physicist ($2,400 to $3,000). Applications received until July 1. To fill vacancies in Bureau of Standards, in connection with original investigations in some field of the bureau's work. Rating on the following optional subjects: Heat, electricity, mechanics, optics, radio, physical metallurgy, or other specialized work in the field of physics.

Radio engineer ($4,000 to $5,000), associate radio engineer ($3,000 to $4,000) and assistant radio engineer ($2,000 to $3,000). Applications received until July 1. To fill vacancies in Department of Engineering, Washington, D. C., Navy Yard, Naval Research Laboratory, Bellevue, D. C., and classified service throughout the United States; conducting or superintending development, design, construction, installation, standardization and writing specifications for practical and special apparatus and methods of radio communication, carrying out radio research and other related work.

Computer. Examinations July 9 and 10. To fill vacancies in Coast and Geodetic Survey. Entrance salary, $1,860; possible increase to $2,400. Required—degree from an "educational institution," with major work in mathematics, physics or engineering.

Electrical draftsman. Applications received until July 8. To fill vacancy at Naval Observatory, Washington, D. C., and similar positions. Entrance salary, $2,400. Requirement—Training and experience in designing lighting, power plant, signal and transmission systems and arrangement of substation equipment; executive ability and skill in highest grade of drafting and calculating.

Mechanical draftsman. Examination July 9. To fill vacanies in Patent Office, Washington, D. C. Entrance salary, $1,860. Requirement, common school education and two years of drafting experience.

Engineering draftsman. Applications received until July 15. To fill a vacancy in the Bureau of Mines for duty at Taft, Calif. Entrance salary $1,680. Requirement, graduation from high school and at least five years general drafting experience, preferably map drafting.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

WITTE ENGINES

The new Witte engine, manufactured by the Witte Engine Works of Kansas City, Mo., is recommended for its dependability and solid construction. It is claimed to be practically trouble proof and to stand up under the hardest usage. It is particularly adapted to wet and cold weather operation, because of the use of the Wico magneto, said to be waterproof and temperature proof. It is used on several makes of concrete mixers, pumps and other construction equipment.

The speed regulator makes it an all-purpose engine with a wide range of power, so that a 6¾ h.p. engine can be slowed down to do the work of a 3 or 4 h.p. engine, with corresponding saving in fuel. The throttling governor is of the steam engine fly-ball type, quick to correct speed variations, automatically operating the butterfly valve in the carburetor and insuring proper mixture of fuel and air.

The all-fuel carburetor permits the use of any low-grade fuel, such as kerosene or distillate. The fuel mixture passes across a hot spot in the center of the cylinder head which quickly prepares it, by perfect vaporization, for instant ignition. The hot area is created by spark and exhaust.

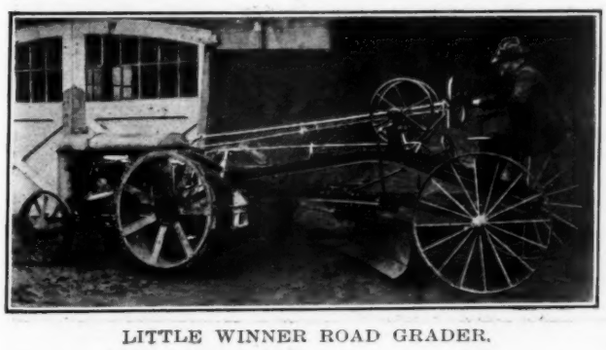
The Wico magneto starts easily at 40 degrees below zero or 100 degrees above. It has only one moving part, the breaker point—no rotating or oscillating parts, no wires or bearings. The spark retarder enables setting the spark back, as in a motor car.

The sizes range from a 2 h.p. engine, which will operate a rotary pump, to 25 h.p., which will operate a rock crusher, sand pump or electric light plant.

LITTLE WINNER ROAD GRADER

The Little Winner road grader, with special attachment for use with a Fordson tractor, is an entirely new device manufactured by the Good Roads Machinery Company of Kennett Square, Pa. It can also be used with two, three or four horses. It is of all steel construction, weighs 1,590 pounds, and has a scraper blade 6 feet long.

When hooked to a Fordson tractor it is provided with a simple and convenient arrangement for one-man control. Both tractor and grader are handled by the operator sitting on the seat at the rear of the grader.



LITTLE WINNER ROAD GRADER.

O. & S. NEW TRUCK CRANE

The Orton & Steinbrenner Co., of Chicago, announce a new "Dependable truck crane" possessing the advantages of a crane with the speed of a motor truck. It revolves completely around a circle. It can be mounted on any new or second-hand truck of five tons' capacity having a distance back of the driver's seat of 8 ft. to the center of the rear axle, although 8 ft. 6 in. is preferable, which distance is found in practically all new 5-ton trucks and most old models.

An exclusive feature of it is the removable counterweight compartment. As the laws of some states do not permit loads in excess of 10 tons to travel over hard-surfaced roads, the ballast which is necessary to maintain the balance may be dropped out by simply opening the bottom of the compartment. Sand is generally used for ballast.

The operating levers are banked on one side in front, the operator having a complete and unobstructed view of the work at all times. The general arrangement of the drums, gears and shafts is similar to that used on Orton & Steinbrenner locomotive cranes, for the past twenty years, and the materials, bearings, etc., used are practically identical with those in the larger and popular sizes.

The power is furnished by a heavy duty "Hercules" motor with four cylinder 4-in. x 5-in. stroke giving 37 h.p. Motor accessories include a Stromberg carburetor, a "Twin Disc" clutch, extra large "Perfex" radiator, high-tension magneto with impulse starter and gas tank of 30 gallons capacity. Double drums are furnished on the main drum shaft, and power is supplied to both so that in bucket handling work the bucket may be hoisted while open as well as closed.

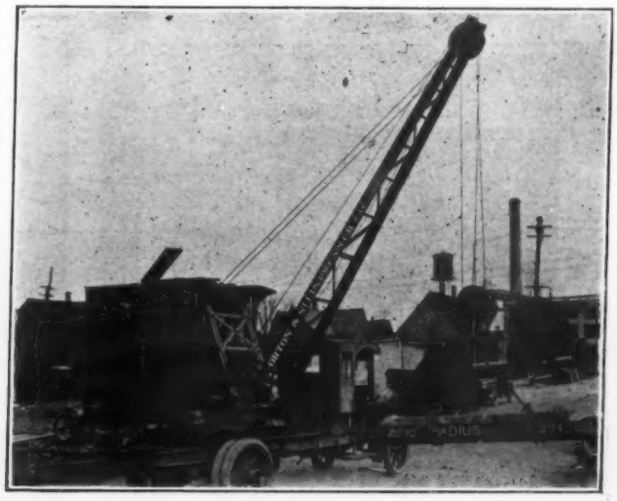
Any material such as sand, gravel, crushed stone, coal, coke or the like, is suitable for handling with this crane equipped with a ½ or ¾ cu. yd. clam shell bucket.

In fact, it will do anything a larger crane can do within its lifting capacity and with the added advantage of being able to travel from point to point quickly and go anywhere a motor truck can go.

INTERFLASH TRAFFIC SIGNAL

A flashing traffic signal is furnished by the Interflash Signal Corporation, of New York City, that is illuminated and operated by "Prestolite" dissolved acetylene gas, new tanks of which can be obtained from any Prestolite agent. The signal is furnished with a steel base, fully assembled and ready to place in position and light, without any concrete construction, wiring or cutting of pavement.

Direction and caution signs in enamel are attached which can be changed readily when desired. The base is circular, 24 in. diameter on the pavement, decreasing to a 6 in. post, giving max-



ORTON & STEINBRENNER NEW TRUCK CRANE

imum clearance for vehicles and minimum obstruction of view. The flame is protected from wind, rain, insects and lack of oxygen by a thermo-siphon flame protector that is exclusive with this company, as are the automatic flasher and the pressure regulator. The mechanism is self-lubricating and the only attention needed is replacing the tank when empty, which can be done by one man in five minutes.

CALCIUM CHLORIDE FOR CONCRETE ROADS

Calcium chloride is being used to a rapidly increasing extent for the curing of concrete, and that known as "Dowflake," manufactured by the Dow Chemical Company of Midland, Mich., has been prepared especially for this purpose. As manufactured, it comes in the form of flakes in 100-pound moisture-proof sacks. It is a straight calcium chloride showing 74% of that chemical, 0.58% sodium chloride, 0.07% calcium hydrate and 25.27% water of crystallization. Attention is called to the fact that it contains no magnesium chloride as does some which is offered. If desired, it will be furnished in 350-pound steel drums instead of the ordinary 100-pound sacks.

CEMENT BAG CLEANER

The Northern Conveyor & Mfg. Co., of Milwaukee, manufactures a cement bag cleaner which it claims to be the fastest built. Its principal feature is the design of the cleaning cage, which is shaped in vertical section like a 4-pointed star, giving eight drops to each revolution and keeping the sacks in continuous motion up and down, similar to that of shaking them by hand. It is claimed that this will clean the bags in a quarter of the time required with a round cage.

The cage is of strong wire mesh on a solidly built frame. The housing is of galvanized sheet iron, dust proof Either electric motor or gasoline engine is provided for power. The cleaner can be mounted on a portable truck, making moving simple and easy.

SIMS PUMP VALVES

The manufacturer of the Sims inclined port pump valve for reciprocating pumps, the Sims Pump Valve Co., of New York City, guarantees that at no time will the valve slip exceed 0.5%; that any disc on these valves will last at least 3 times as long as the same discs on straight port valves, and maintain a tight fit on the seat until entirely worn out; that seat-imprinting or necessity for taking out the discs and refacing will not occur; and that no water hammer will occur until the pump is run at least 20% to 50% above the delivery that produces valve water-hammer in the same pump with a straight port valve. It is also claimed that they will increase the pump efficiency 7½% to 20% and its capacity 20% to 50%.

The valve contains a rotator that causes the disc to rotate slightly each time it opens, thus giving uniform wear to all parts of the disc face and eliminating seat imprinting. Owing to the rotator guide, there is no wear of the disc on the stem. The rotation of the disc is caused by deflecting fins on the bottom of the rotator, causing the water to be ejected tangentially.

BAY CITY SKIMMER SCOOP

A new use of a skimmer scoop, manufactured by the Bay City Dredge Works, of Bay City, Mich., was developed in that city last winter. The company donated a new model 16B crane excavator, equipped with a standard ⅝-yard bucket designed for handling heavy clay or tearing up old asphalt, brick or concrete pavements. This loaded a five-ton truck with 6 to 8 cu. yds. of snow in three minutes, removing the snow as clean as though hand shovels had been used. The machine could have handled a 2-yard bucket. It kept six trucks busy with a two-block haul, and in two days cleaned 12 city blocks, some drifts being as high as 7 feet.

In addition to skimmer scoop, the machine operates clamshell, shovel, dragline or ditcher attachment for unloading cars, city sewer work, or material handling of any kind. In tearing up a macadamized stone road in Essexville, Mich., for the A. J. Campbell Construction Co. of Bay City, it handled material at the rate of 500 cu. yds. per day, cutting the entire width of the road and leaving a smooth grade.

The new model is lighter in weight than the old but sturdier and takes up less room. Belt drive has been replaced by direct gear and pinion connection to the motor, a Hercules 4-cylinder power unit; and the swing drum and cable and A-frame crossbar have been replaced by a worm gear slewing arrangement at the bottom of the boom. The front mast has been removed and the dipper handle made square instead of round. The frame work is solidly riveted together and the machine is shipped completely assembled, except the caterpillars and wheels.

HUG TRUCKS

The Hug Company of Highland, Ill., manufactures 1½-ton and 1¾-ton trucks using 4-cylinder gasoline engines with 3-point suspension, the wheel base being 118 inches and the weight of the chassis 2,900 pounds. One of the special features is the combined gravity and power dump, the position of the body in transit having the low center of gravity and forward-slung advantages hitherto found only in the power dump design. It may also be provided with the Hug automatic, free mixing, self-cleaning cement compartment for carrying concrete batch mixtures.

LUBRICATING OILS

Lubricating oils for steam engines, turbines, Diesel and semi-Diesel engines, motors and auxiliary machinery, are sold

NORTHERN CEMENT BAG CLEANER.

BAY CITY SKIMMER SCOOP HANDLING SNOW.

MUELLER No. "A" Water Tapping Machine

is designed for tapping water mains and inserting corporation cocks under pressure, from 1" to 2" in size. The "A" Machine embodies the latest improvements and represents the most approved practice in both construction and operation.

Increased Dividends for You

The sure way for Public Service Companies to increase dividends is to reduce operating costs. You can materially reduce your tapping costs by using Mueller Tapping Machines and Tools—because they embody the results of over sixty years of practical experience.

MUELLER Tapping Machine No. "A"

will tap water mains and insert corporation stops from 1″ to 2″ in size, in pipe under pressure. Other models of Mueller Tapping Machines specially designed for different conditions. More than 90% of all tapping machines in use today are Mueller-made. Write for complete descriptions and prices.

Mueller Co.
Decatur, Ill., U. S. A.

145-149 W. 30th St., New York; 1072 76 Howard St., San Francisco; 2468 Hunter St., Los Angeles

by the Tidewater Oil Sales Corporation, a special oil being provided for each of these various purposes. In a handsomely illustrated book recently published they describe each of these classes of engines, its special lubricating requirements and the kind of oil best suited for it.

KRODEPROOF

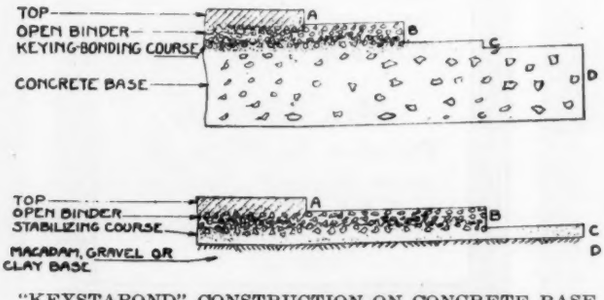
"Krodeproof" is the name given to an emulsified asphalt product by Gardiner & Lewis of New York City, which material is offered for the protection of steel and concrete from acid, gases, fumes, brine drip and corrosion generally. It can be applied directly to any metal surface and to wet surfaces as well as dry. It is claimed to be strongly and permanently adhesive and absolutely waterproof; to contain no volatile solvents; to be absolutely non-inflammable, and give perfect protection against corrosive gases and acids as well as water. It is recommended by the manufacturers for bridges and hydro-electric work, including steel pipe lines, penstocks, tanks, etc.

KEYSTABOND PAVEMENT CONSTRUCTION

A method of constructing asphalt pavements has been developed by the Keystabond Asphalt Paving Co., Inc., of Boston, Mass., to which it has given the name Keystabond method. In constructing on a concrete base, this is cleaned and covered with about ½ inch of 1:3 cement mortar, into which, while still plastic, an open binder is forced by rolling, the mortar rising about ¾ the way to the top of the binder. When the mortar has set, the wearing surface of standard asphalt mixture is laid and rolled. The purpose of this construction is to secure a firm bond of the asphalt surface to the base and prevent creeping or waving. In this construction cold mixtures may be used for the wearing surface.

In resurfacing old macadam or gravel roads with asphalt wearing surfaces, a mortar "stabilizing course" is spread over the old surface and the wearing surface laid as above. This method is also proposed for sidewalks.

The relative thicknesses of the mortar and bonding courses should always be such that the mortar will fill the bottom ¾ of the voids in the bonding course, but no more.



"KEYSTABOND" CONSTRUCTION ON CONCRETE BASE AND ON OLD MACADAM, GRAVEL OR CLAY.

STOP AND GO SIGNALS

The Essco Manufacturing Company of Peoria, Ill., manufactures "Stop" and "Go" signals of two types, known as "R" and "W," each of which is constructed having one, two, three or four sides illuminated, depending upon requirements. Type "R" is furnished with colored roundels and seems to be more popular than Type "W," which uses colored words rather than the color alone, although some cities prefer the latter.

These signals are constructed entirely of aluminum, copper and glass, which makes for long life. Reflection of sunlight from the signals, which may be mistaken for a signal light, is prevented by hoods. The control apparatus, which is housed in a cast-iron cabinet mounted on a pedestal, is simple and positive in action. Various periods between flashes are provided for, and also the changing from automatic operation to hand control instantly. Automatic controls are built for synchronous operation of many signals simultaneously, if desired.

"CELITE" FOR CONCRETE

A material called "Celite" is manufactured by the Celite Products Company of New York, the purpose of which is to increase the workability of cement. It has of itself no cementing quality and has no chemical effect on concrete, but it is claimed that it so increases the flow or workability of cement as to produce a more uniform, watertight, strong and smooth-surfaced concrete with less labor cost, finishing cost and time of mixing. Its use is recommended in proportions varying from 1½ per cent. to 7 per cent. by weight of the cement content, varying with the proportion of coarse aggregate in the mix, although more can be added to give additional workability.

ELKHART TRAFFIC GUIDE

The Elkhart Foundry & Machine Co. of Elkhart, Ind., is placing on the market a traffic guide of the surface or "mushroom" type, which is 17 inches in diameter and 5 inches high and fitted with 11 ruby lenses. It has a removable hand-hole cover, and is sold at $27.50 each f.o.b. Elkhart in quantities of six or more.

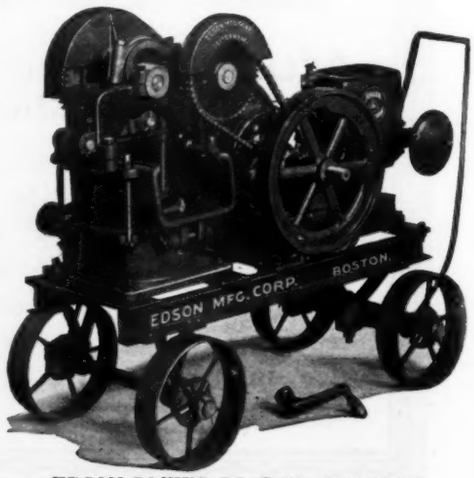
CEMENT LINING FOR C. I. PIPE

The American Cast Iron Pipe Co. of Birmingham, Ala., has developed a process for applying to the inside of cast-iron pipe a lining of Portland cement only 1-16 inch thick, with great density and close adherence to the pipe. The company is experimenting with other types of cement to determine if some of them may be superior to Portland for this purpose. The cement is applied by the centrifugal method.

It is claimed that the cement gives a smoother surface than the iron and raises the cofficient C in the Chezy formula 25 per cent. above that for tar-coated pipe, while the diameter is decreased only ⅛ inch.

NEW EDSON DIAPHRAGM PUMP

The latest power diaphragm pumping unit offered by the Edson Manufacturing Corporation of Boston is shown in the accompanying illustration. One of its pricipal features is the jack which has been redesigned according to correct engineering principles, is rugged and durable and capable of standing up under severe service. The jack frame is cast in one piece, which insures perfect alignment of gears and bearings at all times. The reciprocating motion is obtained by means of an eccentric on the No. 3 size and a crank on the No. 4, which are driven by machine-cut spur gears in the jack shaft, which in turn is driven by the engine through a roller chain drive. There is a very slight loss due to friction of the gears, chain and sprocket. The vertical movement of the diaphragm is guided by a link, insuring long life to the diaphragm. For power, the Fuller & Johnson gasoline engine is used as standard equipment, but other makes of engines will be furnished if the customer desires. The whole unit is mounted on a substantial hand truck fitted with large wheels and wide tires which cause it to run easily and travel over soft ground with very little effort.



EDSON POWER DIAPHRAGM PUMP.

LAMBERT FROST PROOF METER

The Measure of true value in a water meter

The certainty of performance, the long and uninterrupted service for which the LAMBERT METER is particularly noted, tell the water works engineer of today what he most wants to know—the value that is built into a meter.

When a meter embodies unusual engineering achievement; when it is the product of experience, when it yields the unbroken service which LAMBERT users prize so highly, can more conclusive evidence of value be supplied?

Money Never Bought More in a Meter

Catalogue showing full line of meters for every requirement for the asking.

THOMSON METER COMPANY

100-110 Bridge Street **Brooklyn, N. Y.**

LAMBERT
FROST PROOF METERS

New Catalogs of Interest to City and County Engineers, Superintendents of Water Works, Superintendents of Streets, Contractors and All Engaged in Public Works

If you want any of these Catalogs, write the number on a postal, sign your name and address plainly, and mail it to PUBLIC WORKS, 243 West 39th Street, New York. The Catalogs will be sent to you promptly without charge or obligation.

TRAFFIC REGULATIONS

719. The American Gas Accumulator Company of Elizabeth, N. J., publishes a paper by George G. Kelcey entitled, "First Aid to Traffic." 8 pages. 8½x11.

POWER PLANT LUBRICATION

720. The Tidewater Oil Sales Corporation of New York City discusses technically at length the lubrication of various kinds of machinery, for which purpose it produces lubricants. 60 pages. 9x11.

THE HUG TRUCK

721. The Hug Company of Highland, Ill., describes its new model truck and gravity dump body. 4 pages. 8½x11.

HOAR MUCKING SHOVEL

722. The Hoar Shovel Company of Duluth describes a mucking shovel for use in tunnel work, mines, etc., giving details of the shovel and its uses. 24 pages. 8x11.

STOP AND GO SIGNALS

723. The Essco Manufacturing Company of Peoria, Ill., describes the "Stop" and "Go" Signals, with illustrations, in a 4-page folder. 8½x11.

BAKER MOTORS

724. Baker Motors, Inc., of Erie, Pa., describes Baker Engines, both steam and oil burning, for various power purposes. 8 pages. 8½x11.

CATERPILLAR TRACTORS

725. The Holt Manufacturing Company of Peoria, Ill., issues two pamphlets, one describing the 5-ton caterpillar and the other the 10-ton, with complete specifications. Each 8 pages. 8½x10½.

TISCO STEEL

726. The Taylor-Wharton Iron & Steel Company of High Bridge, N. J., issues a booklet describing the advantages and uses of Tisco Manganese Steel. 22 pages. 5x8.

RUSSELL ROAD MACHINERY

727. The Russell Grader Manufacturing Company of Minneapolis issues an illustrated catalogue of its road machines, planers, finishers, drags, scrapers, etc. Printed in two colors and handsomely gotten up. 68 pages. 8½x11.

"TAR-MAC C-P"

728. The American Tar Products Company of Chicago describes and illustrates various methods of using its cold patch material for road repairs. 30 pages. 5x8.

PORTABLE LOADERS

729. The Link-Belt Company of Chicago issues a catalogue describing its complete line of industrial loaders, including belt conveyors, bucket loaders, power swiveling loaders, etc. 40 pages.

GUARANTEED CHEMICALS

730. The LaMotte Chemical Products Company of Baltimore issues a price-list of indicator dyes, H-ion chemicals, synthetic, organic and inorganic chemicals, etc. 8 pages. 5x6½.

INCINERATION FOR MUNICIPALITIES

731. The Decarie Incinerator Company of New York City has published a description of its 300-ton incinerator at 56th Street and 12th Avenue, New York City. Profusely illustrated. 8 pages. 8x10.

EDSON PUMPS

732. The Edson Manufacturing Corporation of Boston describes its diaphragm pumps, both hand and power; odorless force pumps, and suction hose for the same. 9 pages. 8½x11.

INDUSTRIAL NOTES

CHAUSSE FIRE WAGON SHIPMENTS

On April 30th the Chausse Oil Burner Company shipped from Goshen, Ind., six oil-burning fire wagons to the city of Chicago, this being that city's third repeat order, and another to Denver. This is the largest shipment ever made at one time to one user.

PITTSBURGH TESTING LABORATORY

This laboratory announces the occupancy of its new laboratories and office building located at Stevenson and Locust Streets, Pittsburgh. This is a five-story brick-concrete structure, well lighted and ventilated and containing the most improved types of physical testing machines and chemical apparatus. The new building will give the laboratory greatly improved facilities.

PORTLAND CEMENT ASSOCIATION

This Association announces the appointment of L. M. Whitcraft as district engineer in charge of its Philadelphia office, 1315 Walnut Street. Mr. Whitcraft has been connected with the association for eight years as field engineer for the New York office.

AMERICAN ARMOR CORPORATION

This corporation has purchased the patents for bullet resisting armor plate and bullet-proof vests and helmets formerly controlled by the Bullet-Proof Vest Corporation and is now the sole owner, manufacturer and distributor of bullet-resisting devices constructed upon the principle of flexible resistance. Bullet-proof vests weighing approximately 40 per cent. less than any previously offered, are now being made by this company. More than two-score police departments have bought these vests and also the U. S. Cast-Iron Pipe & Foundry Company, the Florence Pipe Foundry & Machine Company, and others.

NORTHWEST ENGINEERING CO.

This company announces that the George B. Curd Equipment Company, with a main office at Cincinnati and district offices at Indianapolis and Lexington, Kentucky, will now handle the sale of Northwest gasoline convertible cranes, draglines and shovels in that territory.

DORR COMPANY NOTES

W. A. Neill, head of the mechanical engineering department of the Dorr Company, will, after June 15th, be located in New York, where the executive offices of the Dorr Company are situated.

The Sanitary Engineering Department of the Dorr Company has established a branch office in Chicago, at 38 South Dearborn street. Frank Bachmann, heretofore a member of the New York staff, will be in charge.

INGERSOLL-RAND COMPANY

L. D. Albin, formerly general sales manager of the Ingersoll-Rand Company, New York City, has been elected vice-president in charge of European sales of that company. D. C. Keefe, formerly assistant general sales manager, has been appointed to succeed Mr. Albin as general sales manager.

NEWS OF THE SOCIETIES

CALENDAR

Sept. 15-18—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention, Topeka, Kan. (Tentative date). Secretary, R. D. Morgan, Mexia, Tex.

Sept. 23-25—CITY MANAGERS' ASSOCIATION. Eleventh annual convention, Montreal, Que., Can. Executive secretary, John G. Stutz, Lawrence, Kan.

Sept. 29-Oct. 3—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention at Hotel Copley Plaza, Boston, Mass.

Sept. 30-Oct. 1-3—NEW ENGLAND WATER WORKS ASSOCIATION. Annual convention at Powers Hotel, Rochester, N. Y. Secretary, Frank J. Gifford, Boston, Mass.

October 8-10—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention at Emporia. Secretary. John G. Stutz, University of Kansas, Lawrence, Kan.

Oct. 14-17—NATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Partridge Inn, Augusta, Ga. Secretary, William R. Arbuckle, supt. fire alarm, Bayonne, N. J.

Nov. 10-18—NATIONAL MUNICIPAL LEAGUE. Annual meeting at Harvard University, Cambridge, Mass.

Nov. 17-19—ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting at San Francisco.

November—NORTH CAROLINA SECTION, AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Charlotte, N. C. Secretary, Thorndike Saville, University of North Carolina, Chapel Hill, N. C.

Jan. 6-9, 1925—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention and road show at Chicago, Ill.

SOCIETY FOR PROMOTION OF ENGINEERING EDUCATION.

This society held its thirty-second annual meeting at the University of Colorado, Boulder, Colo., June 25th to 28th. About 150 members were present and more than 200 guests, the members representing seventy colleges scattered through 38 states, Canada and Hawaii.

Among the subjects discussed were those of longer courses, Dean Pegram of Columbia stating that the six-year course there had resulted in a negligible number of students in the course, and Professor Burgess of Northwestern University stating that fifteen years' experience with a 5-year engineering curriculum showed an average annual increase of 9%, but only 13% of those who enter complete the fourth year and only 8% the fifth year. In the discussion it was stated that at Iowa State College more than 25% of the engineering graduates have had sufficient college work in advance to be equivalent to five to eight years of total college work before graduation. It appeared to be the general opinion that, while more than four years was desirable, it could not be successfully carried out except by concerted action by all the best engineering colleges.

Director Wickenden of the Board of Investigation and Coordination stated that less than half the law students in the country take as much college work as is required in every standard engineering course, and only by concerted action of all the best medical schools has the medical profession succeeded in establishing the present standard of six years' college work followed by one year of hospital experience. This has, however, reduced the number of medical graduates about one-third between 1908 and 1923.

The new officers of the society are: President, Dean A. A. Potter of Purdue; vice-presidents, Prof. R. S. King, Georgia Institute of Technology, and Dean G. B. Pegram of Columbia University. Secretary Bishop and Treasurer Wiley were re-elected. The society will meet next year at Union College, Schenectady, N. Y.

LEAGUE OF TEXAS MUNICIPALITIES

The appointment of Robert D. Jackson as head of the Division of Government Research, Bureau of Extension, University of Texas, becomes effective June 15, 1924. This appointment follows the resignation of Frank M. Stewart, who, for the past five years, has filled the position. The succession is a logical one, as Mr. Jackson has served as assistant secretary to the League for three years.

The Division of Government Research acts as Secretariat of the League of Texas Municipalities, and the head of the Division is Executive Secretary of the League.

AMERICAN ROAD BUILDERS' ASSOCIATION

The 1925 Convention and Road Show will be held at the Coliseum, Chicago, on January 6, 7, 8 and 9, 1925, according to official information from Charles M. Upham, director of the Association and state highway engineer of North Carolina.

BOOK REVIEWS

THE OILING OF EARTH ROADS

This is a circular by Wilbur M. Wilson, research professor of structural engineering at the University of Illinois Engineering Experiment Station, and published this month by the university. It gives the result of investigations conducted under the supervision of Professor C. C. Williams, with the co-operation of the Champaign county road officials, the Holt Manufacturing Co., J. D. Adams & Co., the Bayne Mfg. Co., the Nelson Concrete Culvert Co., the Russell Grader Co., the Illinois Corrugated Metal Co., and several oil companies. The conclusions are based upon observation made partly on special experimental roads and partly on others.

The author names eight important causes of failure of oiled roads. He estimates the cost per mile, 12 feet wide, at $417.10 per year. He concludes that an oiled road, propely maintained, will be in good condition ten or eleven months of the year, and passable for automobiles the balance of the year. He concludes with recommendations for construction and maintenance. 25 pages. 6x9.

GENERAL DATA ON THE ACTIVATED SLUDGE PROCESS.

The above is the title of a book that has been compiled and published by the General Filtration Company, in which have been collected the most valuable articles that have appeared on the subject.

The book opens with an abstract of the chapter on Activated Sludge in Metcalf & Eddy's "Sewerage and Sewage Disposal," giving the general theory of the process. This is followed by abstracts from Public Health Bulletin No. 132, entitled, "Sewage Treatment in the United States," by H. H. Wagenhalls, E. J. Theriault and H. B. Hommon, in which these authors discuss the process and give descriptions of the activated sludge plants at Houston and Sherman, Tex. There are also given abstracts of the descriptions of the Milwaukee sewage disposal plant, and the Gastonia, N. C., plant that have appeared in PUBLIC WORKS; also abstracts of a description of the Indianapolis plant, as published in "Engineering News Record," and a description of the North Side Plant of the Sanitary District of Chicago, which was furnished by Langdon Pearse, sanitary engineer of the district. These descriptions are accompanied by diagrams and photographs and furnish an excellent idea of the construction details as well as the chemical and biological theories of this type of plant as it has been developed to date.

In addition, the book contains a chapter entiled, "Containers for Diffuser Plates," in which are described and illustrated the containers for the plants at Milwaukee, Chicago, Indianapolis, Graham and Houston, Tex., and Gastonia, N. C. Also a chapter on the fertilizing value of activated sludge, drawn largely from Milwaukee experiments; and one giving comparative data on plant design and operation.

While this book is published by the manufacturers of filtros plates, it contains no advertising of these plates other than the mention of them contained in the several descriptions from which the material was drawn. It combines in one volume of 95 pages a large amount of valuable information on the subject and will be sent without charge to those who have a real professional interest in the subject.

HOME SEWAGE DISPOSAL

A book by this name, published by J. B. Lippincott Company, has been written by W. A. Hardenbergh, sanitary engineer and director of rural sanitation of the Board of Health of Jefferson County, Ala.; also major of the Sanitary Corps. Mr. Hardenbergh had a number of years' experience in the sanitation of the territories surrounding the cantonments during the war and with the Public Health Service since that time, and probably few men in the country are as well qualified as he to write a book dealing with the disposal of sewage of dwellings and in-

stitutions where a water carriage sewerage system is not installed.

This book has been prepared especially for health officers and health workers in the field, to furnish reliable data for engineers and others engaged in sewage disposal for homes and institutions, and to give the student an insight into the principles and problems underlying sewage disposal in its relation to health work.

The book is divided into four parts—"Introductory," "Sewage Disposal for Unsewered Sections," "The Treatment of Sewage," and "Problems in Field Sanitation."

The author describes, with a detail that could be written only as a result of experience, the methods of dealing with situations where only the most primitive methods have previously been employed and, aided by sketches and dimension plans, the latest practice approved by sanitarians for affording reasonably cheap and readily installed substitutes. These include the double compartment concrete vault, the box and pan system, the septic closet, the chemical closet, the small septic tank, the small Imhoff tank and some other methods.

The fourth part contains a chapter on construction details, dealing chiefly with the making of concrete structures; one on soil and water pollution, summarizing the latest available information on the subject; and a discussion on flies and filth-borne diseases and the important relation between the two.

An appendix gives sample ordinances dealing with the matters discussed in this book, and specifications for the construction of structures described therein as prepared by the Engineering Department of the Alabama State Board of Health.

The book contains 274 pages, 5½x8, and is abundantly illustrated with photographs, sketches and plans. It gives prices where these would seem to be of any service in these days of fluctuating prices, and such other information as to enable an intelligent sanitary engineer to plan a plant, estimate upon its cost, construct it and supervise the operation.

U. S. CIVIL SERVICE EXAMINATIONS

CIVIL SERVICE EXAMINATIONS

Consulting Highway Engineer. Applications received until July 22. To fill vacancies in the Bureau of Public Roads. Entrance salary, $5,200 a year. Requirement, graduation from engineering college, at least 15 years' practical experience, not less than 10 in charge of important highway engineering projects and at least 5 in a responsible administrative position comparable in scope to that of chief engineer of a State highway department.

Design Draftsman (mechanical). Applications received until August 5. To fill a vacancy at the U. S. Naval Station, Pear Harbor, Hawaii. Entrance salary, $9.04 a day. Requirement, graduation from technical school and (1) five years' experience in mechanical drafting, at least three on original work under nominal supervision; or (2) completion of course in mechanical drafting and one year on orginal work. Or seven years' experience, two on original work.

Plumbing Specification Writer. Applications received until August 5. To fill a vacancy in the Bureau of Yards and Docks, Navy Department. Entrance salary, $2,400 a year. Requirement, at least eight years in plumbing work, including sewerage, sewage disposal, water supply, storm water drainage, gas distributing systems, and inside plumbing and bakery, kitchen, laundry and sterilizing equipment.

Lithographic Draftsman. Applications received until August 12. To fill vacancies in Hydrographic Office of Navy Department, and in Coast and Geodetic Survey. Entrance salary, $1,500 to $1,680 a year. Requirement, common-school education and not less than four years' experience as lithographic draftsman.

INDUSTRIAL NOTES

DE LAVAL STEAM TURBINE CO.

This company announces the formation of a Pacific Coast sales organization covering the states of California, Oregon and Washington and parts of adjoining states, under the direction of William Pullen. An office at 312 Union Oil Building, Los Angeles, is in charge of Ivan E. Goodner; one at 531 Rialto Building, San Francisco, is in charge of Mr. Pullen, assisted by Eck Baughn and Charles P. Markley, and a third at 1306-7 L. C. Smith Building, Seattle, is in charge of James Q. Osborne, assisted by F. A. Hurlbut.

EXPOSITION OF INVENTIONS

An exposition of inventions is to be held, December 8 to 13 inclusive, in the Engineering Societies Building, New York City, under the direction of the Inventors' Section of the American Institute of the City of New York. Here will be shown developments of various machines, utilities and processing methods. At previous "fairs" of this Institute, which were begun in 1828, there were first shown to the public the Morse telegraph, Hoe printing press, Bell telephone, and Colt revolver. Arrangements for displaying working models or actual devices can be made with a committee of the Institute at 47 West 34th Street, New York.

CHAIN BELT CO. OFFICERS

J. C. Merwin, works manager of the Chain Belt Company, Milwaukee, was elected second vice-president at the annual meeting of the company held in Milwaukee this month. Other new officers elected were: Brinton Welser as secretary, and C. E. Stone as assistant secretary. The officers re-elected were: C. R. Messinger, president; Clifford F. Messinger, first vice-president; C. L. Pfeifer, treasurer.

INDUSTRIAL WORKS REPRESENTATIVE

The Industrial Works, of Bay City, Mich., announces the appointment of Ridenour, Seaver & Kendig, 773 Ellicott Square, Buffalo, N. Y. (S. N. Ridenour, resident manager) as its representative in that district.

DORRCO SCREENS IN CALIFORNIA

In connection with the convention of the American Society of Civil Engineers at Pasadena, Cal., last month, a visit was made to the sewage treatment plant of that city. This plant is one of seven in California that use Dorrco screens, the others being at Venice, Long Beach, Los Angeles, San Pedro, Ventura and Lodi. The Dorr Company issued as a souvenir a small booklet describing the Pasadena plant.

This is an activated sludge plant which treats the sewage of the cities of Pasadena, South Pasadena and Alhambra, with a capacity of 6,000,000 gallons a day. The sewage receives preliminary treatment with Dorrco screens, and the aeration is followed by continuous sedimentation in two Dorr sewage classifiers. The plant was described in Public Works for February, 1923.

The booklet also describes briefly the Dorrco plant still under construction at Los Angeles.

MASSEY CONCRETE PRODUCTS PLANT PURCHASED BY GEORGE CUTTER WORKS

The purchase of the Milwaukee plant of the Massey Concrete Products Corporation and the concrete post business by the George Cutter Company of Indiana has just been announced by the Westinghouse Electric & Manufacturing Company, effective July 1. The Massey Corporation has been engaged in the concrete post industry, manufacturing Hollowspun reinforced concrete street-lighting standards and concrete poles for street railway service at the Milwaukee plant.

For a number of years the Westinghouse Company, through connections and relations with the George Cutter Company, has been engaged in the manufacture of cast iron poles for industrial ornamental and street-lighting purposes at the George Cutter Works at South Bend, Indiana. The addition of the Hollowspun line assures the Westinghouse Company a place among the foremost manufacturers in ornamental street-lighting equipment.

Hollowspun lighting standards which are made by the centrifugal process method demonstrate the possibilities of efficiently moulding concrete. The tremendous force with which the concrete is tamped in the mould and around the reinforcement absolutely insures a uniform strength and surface texture throughout the length of the product.

New Appliances

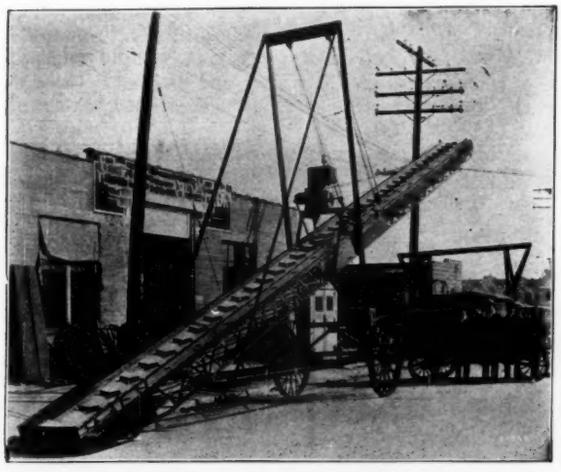
Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

"NORTHERN" CONVEYORS

The Northern Conveyor & Mfg. Co., of Milwaukee, makes conveyors of a number of sizes, known as "Northern King," 16 to 100 feet long with 24′ belt, "Northern Junior," 16 to 50 with 15″ belt, and "Northern Special," 22 feet long with 12″ belt. Some of the features of which the manufacturer is especially proud are: The hopper end of every machine is built low enough to go under all classes of drop-bottom cars to unload them from below—the cheapest method of unloading railroad cars since it does away with most of the shoveling. Industrial plants and contractors around Milwaukee are, it is said, handling sand, stone, coal, etc., for 4 to 6 or 7 cents a ton, which is about 90% less than that of handling by shovel.

These conveyors are built in one piece as nearly as is possible, thus having a frame rigid from end to end, which is necessary for keeping the belt operating properly in the center.

The machines are usually mounted on the company's exclusive design of portable hoisting truck which permits changing the elevation of the conveyor while the machine is in operation and moving it easily from job to job on its own wheels with a self-contained power plant.



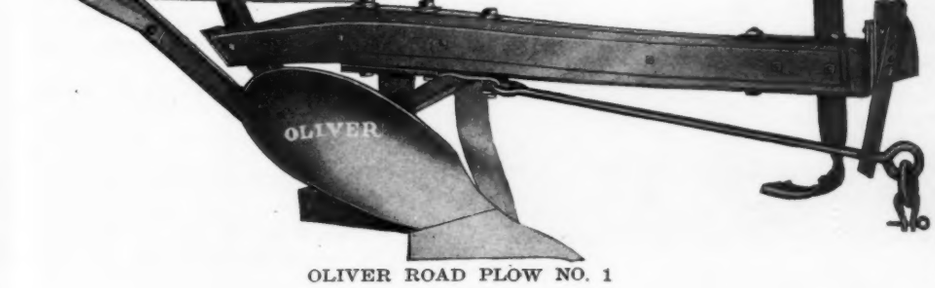
"NORTHERN KING" CONVEYOR 60 FEET LONG.

OLIVER ROAD PLOW NO. 1

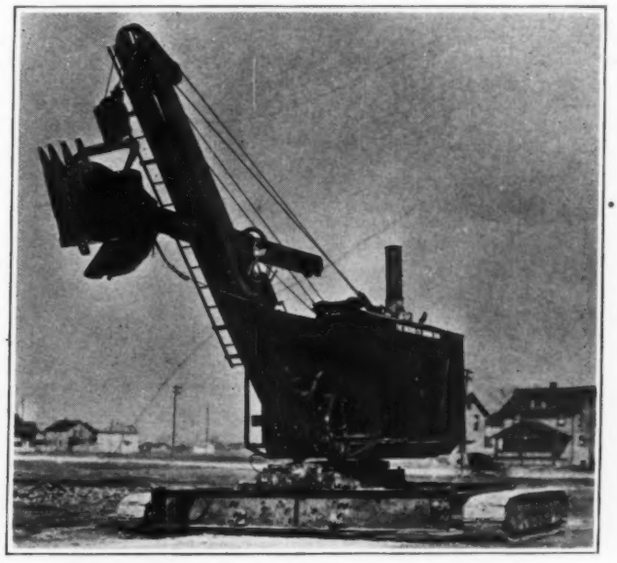
The Oliver Chilled Plow Works, of South Bend, Ind., makes a road and grading plow No. 1, that has a very strong wood beam, especially built and equipped just for road work. The mouldboard is long, narrow and curved so that the dirt is raised high before it is dropped. This breaks up the dirt and drops it in such condition that the scraper can pick up its load easily and it is much better for dumping on the road as it will more readily compact and press into a road bed than will dirt in the form of large lumps. The share makes a narrow angle with the landside, giving good penetration.

The handles and heavy beam are of oak. The beam is reinforced by iron straps on three sides. The beam standard, beam braces, and the standing coulter are exceptionally heavy and strong.

A dial hitch for tractor use is supplied. This hitch gives a wide range of adjustment to fit varied conditions. An adjustable gauge shoe is regular equipment.



OLIVER ROAD PLOW NO. 1



OSGOOD SEWER TRENCHING SHOVEL.

OSGOOD SEWER TRENCHING SHOVEL

A sewer trenching machine of unusual design has been shipped by The Osgood Company, Marion, Ohio, to Thomas Holahan of Rochester, New York.

The machine consists of a standard 1¼-yd. heavy duty continuous tread steam shovel equipped with a 1-yd. dipper, 25-ft. boom and 18-ft. handle. The machine is also equipped with auxiliary hoisting drum for use as dragline or clamshell outfit.

In addition to the standard equipment, a 34-ft. dipper handle and special continuous tread mounting was included. The mounting is of structural steel, designed for attachment to the regular continuous tread truck frame. The special frame measures 26 ft. in width overall and is designed for spanning sewer trenches without the use of mats. It is gear driven and has the same flexibility as the standard continuous tread.

The machine will be used in excavating for about 5,000 ft. of 72-in. concrete sewer in Rochester. The excavating will run from 16 to 25 ft. in depth. The first 8 ft. is earth underlaid with limestone rock.

RIX FORDSON DIGGER

The Rix Products Company of Milwaukee, manufactures a digger consisting of a bucket or dipper, the dipper stick being carried on a heavy structural steel framework which is mounted on a Fordson tractor. The action is smilar to that of a steam shovel except that the boom is stationary directly over the tractor so as to take advantage of the weight of the tractor. The dipper is operated by a crowding mechanism for downward or digging thrust and is pulled forward and raised by cable operated from the hoisting mechanism.

Power is taken from the regular Fordson standard takeoff by means of belt with adjustable idler pulley. The gear set is reversible, functioning independently of the power takeoff by which it is operated. The crowding mechanism is of the rack and gear type operated by means of a chain working in conjunction with the gear set. The elevating mechanism is of the regular double pulley and cable type; a ⅜-inch cable being wound over a 14-in. x 8-in. drum which has a free spool, facilitating speed and efficient operation. A self-locking device of the worm and sector type, operative at any height, eliminates the necessity for brakes on the crowding mechanism.

The boom, consisting of two 4-inch channel beams, is carried far enough back to give the operator a full view of the dipper and carries a ballast box mounted in the rear framework so that the digger is balanced at all times, the capacity of the box being 1,000 to 1,500 pounds. The construction of braces and supports throws practically all of the lifting weight onto the axle and ballast box. The dipper is provided with a swinging back, hinged on top and held at the bottom by a latch, a trip line from which is controlled by the operator.

As this digger employs a crowding action and hoisting mechanism on the dipper stick, it enables the operator to dig in and load the dipper when in a stationary position and to extend the loaded dipper over a wagon or cart.

The makers recommend this digger for handling sand and gravel from pits, light road grading and shoulder finishing, handling aggregate, etc.; for excavating subgrade for concrete sidewalks, and for all kinds of stripping work.

RIX FORDSON DIGGER.

HELTZEL HAND-OPERATED ROAD FINISHER

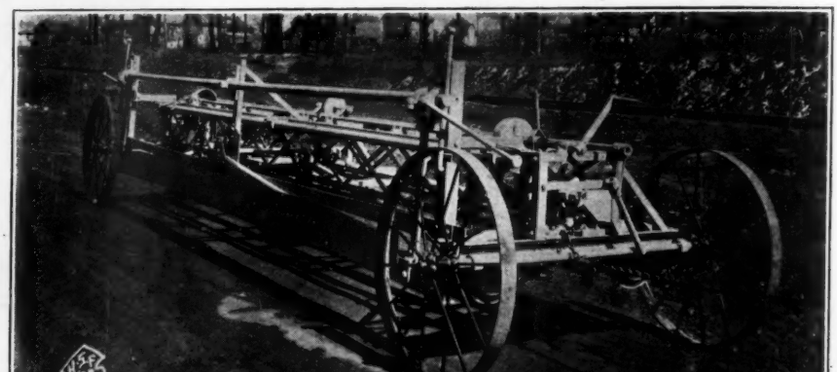
The Heltzel Steel Form & Iron Company of Warren, Ohio, has placed on the market an improved hand operated finishing machine which is in some respects similar to the power finishers that they placed on the market early this year, having many of the same parts. Since the engine, transmission and other parts are unnecessary, it is possible to sell it at about half the cost of power operated machines.

Some years ago the above company made a number of hand-operated finishers, most of which are still in use in various parts of the country. There was, however, a drawback to the old type due to the fact that they were not adapted to all classes of work, and for this reason were withdrawn from the market. In the meantime J. Wm. Heltzel took upon himself the task of redesigning them and added many improvements.

The new model is considerably heavier and this enables it to push a greater body of concrete forward in striking-off without slippage of track wheels. At the same time the operation does not require as much power as with the older models. Although operated under hand power, it will accomplish all that the various machines do.

In the front of the machine is placed the strike-off which spreads and strikes-off the concrete to the proper crown. While striking-off, it compresses the concrete firmly each time the strike-off reaches the center of travel.

Following the strike-off is the tamp, which can be regulated to strike either in unison or alternatingly. In striking in unison, both ends of the tamp are raised vertically and dropped. To adjust it for tamping alternatingly, either one of the cams is turned half way around on the shaft; thus one end of the tamp is picked up and dropped, then the other, as in hand tamping. It is obvious that when working alternatingly, only one-half the power is required in operating the tamp, and this was one of the pleasing features of the old type of finisher.



HELTZEL HAND FINISHER.

Following the tamp, the finisher operates a rubberized belt of generous width, which works automatically when lowered and is automatically stopped when in raised position.

Two men are required to operate the hand model, but if conditions are right and the mix is not too dry nor too wet, the machine will give a perfect finish the first time over and the operators can spend most of their time in doing other work. Where the mix is extremely dry, the machine should be run over the work

(*Continued on page 42*)

NEW CATALOGS

(If you want any of these catalogs send the number with your name and address to PUBLIC WORKS and it will be sent to you promptly without charge or obligation.)

CATALOGUES

ROAD FINISHERS

733. The Heltzel Steel Form & Iron Company of Warren, Ohio, publishes a treatise on finishers, strike-offs and graders, describing its products. 16 pages. 8½x11.

WATERWORKS EQUIPMENT

734. H. W. Clark Company of Mattoon, Ill., describes its meter boxes, coupling yokes, service boxes, meter testing machines and other appliances. 74 pages. 6x9.

ROAD-BUILDING EQUIPMENT

735. The Oliver Chilled Plow Works of South Bend, Ind., describes plows for various kinds of road work. 12 pages. 3x6.

STREET LIGHTING

736. The General Electric Company of Schenectady, N. Y., under the title, "The Splendor of Well Lighted Streets," outlines its resources for developing and manufacturing street-lighting equipment. Handsomely illustrated. 36 pages. 8x11.

OXY-ACETYLENE WELDING

737. The Oxweld Acetylene Company of New York City, publishes a catalogue describing in detail its acetylene generators, welding, cutting, bracing and other equipment. 48 pages. 8x11.

OTIS LABOR SAVING EQUIPMENT

738. The Otis Engine Company of New York City, describe gasoline hoists, power units, cranes and railroad cars using either the Fordson tractor or the Fordson engine. 28 pages. 8½x11.

SUPERHEATERS

739. The Superheater Company of New York City, describes Elesco superheaters and their history. 16 pages. 4x9.

FULTON-DIESEL ENGINES

740. The Fulton Iron Works Company of St. Louis, describes Fulton-Diesels as used for power in a number of plants. 4 pages. 8½x11.

ROAD MACHINERY

741. The Gilbert Manufacturing Company of Aberdeen, S. D., describes its Universal road machine, scraper, grader, etc., attached to a Fordson. 10 pages. 8¼x11¼.

CENTRIFUGAL PUMPS

742. Barrett, Haentjen & Company of Hazelton, Pa., describe their centrifugal pumps, check valves and strainers, pump primers, etc. 40 pages. 8½x11.

SELF-LOADING SCRAPERS

743. The Baker Manufacturing Company of Springfield, Ill., issues a new catalogue on Baker-Maney self-loading 4-wheel scrapers. 24 pages. 7½x10½.

DUMPING BUCKET

744. The Penn Foundry & Manufacturing Company of Reading, Pa., describes dumping buckets and tubs, dump cars, concrete carts, etc. 44 pages. 8x11.

ENGINES AND BOILERS

745. A. B. Farquhar Company of York, Pa., describes stone crushing equipment, road engines and other contractor's machinery. 16 pages. 8x11.

ENGINES, HOISTS, ETC.

746. Orr, Sembower & Company, Inc., of Reading, Pa., describes boilers, engines, hoists, mixers, etc. 84 pages. 8x11.

JOHNSON WELL SCREENS

747. Edward E. Johnson, Inc., of St. Paul, Minn., describes well screens for pipes from 2-inch to 24-inch diameter; also pump rod couplings; and gives instructions for use. 78 pages. 5x7¼.

WATER SERVICE APPLIANCES

748. The Ford Meter Box Company, of Wabash, Ind., describes service plugs for replacing defective stop cocks, and "Ram's Horn" meter holding frames. 8 pages. 8½x11.

The Switchboard Comes to Life

Zero hour approaches. Wire chief and assistants are set for the "cut-over" that will bring a new central office into being.

In the room above operators sit at the new switchboard. Two years this equipment has been building. It embodies the developments of hundreds of engineers and incorporates the scientific research of several decades. Now it is ready, tested in its parts but unused as an implement of service.

In the terminal room men stand in line before frames of myriad wires, the connections broken by tiny insulators. Midnight comes. A handkerchief is waved. The insulators are ripped from the frames. In a second the new switchboard becomes a thing alive. Without their knowledge thousands of subscribers are transferred from the old switchboard to the new. Even a chance conversation begun through the old board is continued without interruption through the new. The new exchange provides for further growth.

This cut-over of a switchboard is but one example, one of many engineering achievements that have made possible a wider and prompter use of the telephone.

To-day, in maintaining a national telephone service, the American Telephone and Telegraph Company, through its engineering and research departments, continuously makes available for its Associated Companies improvements in apparatus and in methods of operation.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

(*Continued from page* 40)

twice. To get best results with a hand operated finisher, the slump of concrete should not be less than one inch nor greater than two or three inches.

The maker claims that these hand finishers will work back of any of the largest mixers and will handle all the concrete that is possible to mix. In fact, nearly all the older models were placed back of 21-E's. There being no delicate parts on this machine, its life is very long, and it is possible to change from one size machine to another by ordering the cross pieces.

REFUSE VEHICLES

The Convertible Wagon - Trailer Company of Buffalo and Toronto offer to city officials a wagon specially designed for refuse collection. The upper part of the body is formed by hinged slat sides which are raised or lowered as required, being dropped at the commencement of the load to reduce lift of the refuse receptacle, and raised later if rubbish is being collected, thus giving the wagon a water-level capacity of 4 cubic yards. For ashes the sides are not raised and the capacity is 2 1-2 cubic yards. The wagon is provided with a waterproof cover which unrolls from the driver's seat with a view to preventing the escape of foul odors, of wastepaper and other refuse. It also serves to keep the matrial dry in wet weather.

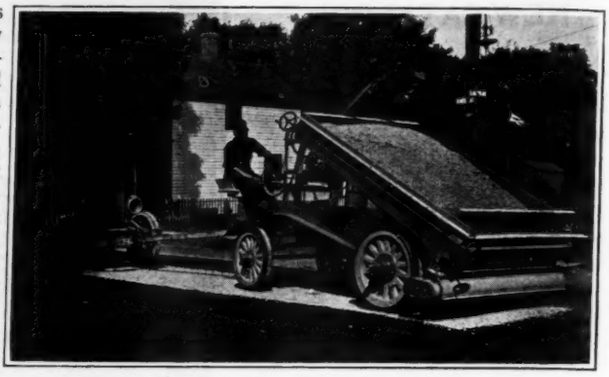
The wagon is a rear dump of the roller type, so counter-balanced that the driver can easily bring it back from the dumping angle with one hand. The rear is wider than the front so as to permit refuse packed in the body to slide out freely in dumping.

The company also manufactures a trailer of the roller-bearing, rubber-tired, rear dump type, which can be instantly converted from a horse-drawn wagon to a trailer. It uses the drop slat sides, as in the wagon described above.

AUSTIN BELT CONVEYORS

The Austin-Western Road Machinery Company of Chicago has just put on the market the Austin Portable Belt Conveyor, which is especially intended for handling gravel or stone, sand, earth, coal and similar materials. It is claimed to be especially efficient for unloading hopper-bottom cars and equally efficient in reclaiming material from stockpiles. The manufacturer calls special attention to the Alemite oiling system, which forces the lubricant into all bearings; the complete elimination of live shafts; the protection and support of the roller chain drive and of the internal gear drive; the carrying of both main drums on roller bearings; the sliding of the gas engine on its base for tightening the belt; relief springs to protect the belt from injury; a self-cleaning tail roller; and closely spaced rollers along the hopper section.

These conveyors are supplied in any desired lengths between 26 feet and 74 feet in multiples of 6 feet. A 2-wheel truck is supplied with shorter conveyors and a 4-wheel truck with the longer ones. Either gas engine or electric motor drive is furnished, either being attached near the ground where it is readily accessible.



RELIANCE CHIP AND SAND SPREADER.

CHIP AND SAND SPREADER

The Universal Road Machinery Co., of Kingston, N. Y., is just placing on the market the "Reliance" chip and sand spreader which it has been developing for the past two years and which was used continuously last season by the New York State Highway Department. It is used for placing a blotter coat of chips or sand on oiled surfaces and is said to place as much material as ten or twelve men could by hand, and to spread with perfect evenness any desired quantity, the amount being regulated by means of the tail gate, which is raised and lowered by a hand wheel operated from the driver's seat. It spreads to a width of 8 feet, the same width as an ordinary oiler, and two machines will cover as fast as the oil is applied.

The spreading unit is pushed with the tail board ahead, so that the oil is covered ahead of the wheels. The spreader is pushed by a truck, roller or tractor, or it can be hauled on an offset if desired. (It was designed to be operated with a Fordson tractor.) When empty, it is hauled with a draw pole like an ordinary trailer.

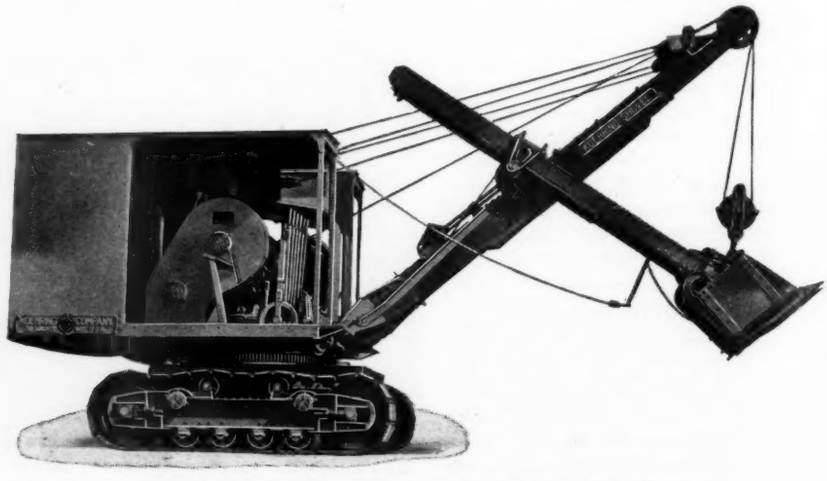
It is fitted with solid rubber tires and springs and the wheels are furnished with roller bearings. The capacity of the body is 3 tons level full, which will cover from 500 to 1,000 feet of roadway, depending on the thickness of the material spread.

KOEHRING HEAVY-DUTY SHOVEL

The Koehring Company of Milwaukee, makes a gasoline shovel for which it claims an extra margin of strength in every detail. Ninety-five percent by weight of all castings are high-carbon annealed cast steel. A short boom and long dipper stick permit it to work in close quarters with low head room, long reach and high lift.

There are three independently operated drums, one for hoisting the dipper, one for crowding out or racking the dipper and the third for hoisting the boom. The crowding and racking cables, wound on the same drum, are kept taut at all times.

Power is furnished by the Standard Wisconsin gasoline engine specially designed for power shovel work. For traction there are two speeds forward and two reverse. Two sizes of shovel are made. No. 1 has a capacity, water measure, of ⅝ cu. yd., boom length of 18 ft. 6 in., dipper stick 14 ft. long, rotating speed of 3½ r.p.m., and speeds of ⅜ and 1⅛ miles per hour. No. 2 has a dipper of 1-1/16 cu. yd. water capacity, boom 20 ft. 6 in. long, dipper stick 16 ft. long, rotating speed of 3 r.p.m., and speeds of ½ and 1⅛ miles per hour.



KOEHRING HEAVY-DUTY GASOLINE SHOVEL.

For Public Places Parks and Golf Links

This Mueller device takes the place of the old style, sloppy hydrant. No. E-862 is designed for outdoor use, and has the valve placed below the frost line, thus making special packing to prevent freezing unnecessary. No. E-863 is designed for use indoors, or in southern latitudes, where there is no danger from frost, and it is consequently made without a stop and drain device.

MUELLER Sprinkling and Flushing Hydrant

closes flush with the ground or floor, which does away with the unsightly goose neck, as well as eliminating the obstruction to lawn mower or truck. The construction provides for the disposal of water through the bottom of the box, thus eliminating the possibility of freezing, due to the formation of puddles.

Write for detailed descriptions and prices.

Mueller Co.,
Decatur, Ill., U. S. A.
145-149 W. 30th St., New York;
1072-76 Howard St., San Francisco;
2468 Hunter St., Los Angeles

E-863

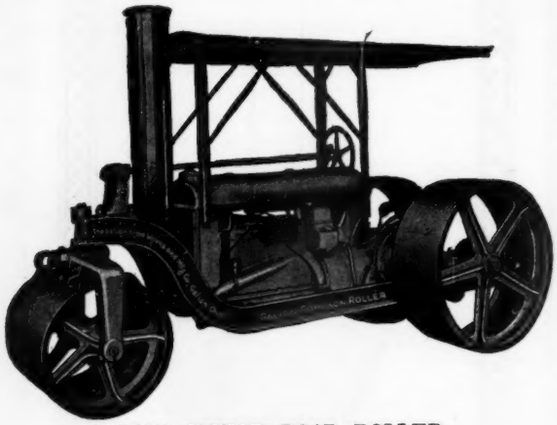
E-862
[Patented]

GALION JUNIOR ROAD ROLLER

The Galion Iron Works & Mfg. Co., of Galion, O., has just placed on the market the "Galion Junior" road roller, of the three-wheel macadam type, made in 3, 4 and 5-ton sizes.

The power unit consists of a Fordson tractor from which the front truck and rear wheels have been removed and which is carried on a full length channel frame shaped to receive the king-post socket casting at the front end and extending to the rear of the unit so as to permit a scarifier to be properly attached. In placing the power unit in the frame the three-point suspension feature is employed.

A full-length rear axle carries the weight through brackets attached to the main frame members in much the same manner as employed for larger size macadam rollers. A train of steel gears connects the main shaft of the Fordson with the driving gear on the rear roll, permitting the use of all the speeds of the Fordson and increasing the power one-third.



GALION JUNIOR ROAD ROLLER.

A planer may be placed in front of the front roll, adjustable for light or heavy cuts and the angle adjustable for throwing dirt to either side. Each size of roller can be obtained either with or without scarifier or planer or both.

METER BOX LOCKS

The company makes meter boxes for Mattoon, Ill., manufacturers locks for its meter boxes that protect them from unauthorized persons. They are provided with special keys that also facilitate quick opening of the lid. They are made in two styles.

The "Perfect" lock comprises a large one-piece bolt of phosphor bronze, perfectly and mechanically fitted to a true machined hole in lid, securely held in place without bolts, rivets, or screws.

The No. 1 five-cornered bolt head is of special size, requiring the Clark Key to operate it. It is also supplied in standard service box size when No. 2 bolt is specified. In operating, one-third turn to the right, clockwise, causes the hooked end of bolt to ride up an inclined plane on the cover, thus securely locking the box. One-third turn to the left, counter-clockwise, causes the hooked end of bolt to ride up a similar inclined plane on the lid, thus unlocking the box and holding bolt in place. Both in locking and unlocking, the bolt is turned until tight, engaging on the lugs provided for it. There is never any guesswork as to the position of lock, and there is no bothersome fumbling in getting the box opened. Always locks in one position. Its use causes a slight abrasion of the bronze bolt on the cast iron contact surfaces of the inclined planes, keeping all parts "rustproof" and operative. Bolt head, which is flush with top of lid, fits in a self-cleaning recessed slot.

PERFECT LOCK.

WONDER LOCK.

Operating key is provided with double prong on handle for engagement into notched recess on lid for quick removal.

The "Wonder" lock is of bar and cam construction; secure, quick operating, and always dependable. The key, inserted in the hole in the center of the lid and turned one-fourth revolution to the right, clockwise, securely locks the box. The key is used as a handle for lifting the lid, and cannot be removed until the lid is locked. Bars are of special mix phosphor bronze. No bolts, rivets or screws are used in this lock.

Clark locks of both types are always operative, even though not used for years. They will not rust tight nor deteriorate. Operated by one hand, leaving the other free for record book and pencil.

In the Clark meter box the meter is read, box closed and securely locked in twenty seconds' time. Removal and replacement of meter is accomplished in fifty seconds, including the closing and securely locking of box.

The company makes meter boxes for use in both southern and northern climates.

INDUSTRIAL NOTES

DIRECT OXIDATION PROCESS

C. P. Landreth, the inventor of the "direct oxidation process" of sewage treatment, has dissociated himself from all promoting agencies, and is now sole owner of all patents and rights for this process and device, and has taken over the plant for manufacturing the apparatus, together with its operating force.

During the past two years important mechanical improvements in the apparatus have been perfected. These include the construction of the tank of reinforced concrete; the placing of the operating mechanism under the tank, where it is out of the way, but easily accessible; improvements in the electrodes, which are easily accessible and are individually removable if necessary; the elements that act as agitators now move vertically instead of rotating, and the design of electrodes and agitators is such as to greatly reduce the loss of head. There are also improvements in the application of lime and in automatic regulation of dose to changing requirements of the sewage.

STORING INDUSTRIAL COAL

The storing of coal this summer for next winter's use is advocated by Secretary Hoover, and Russell B. Williams, of the Link Belt Company, in discussing methods of storing, analyzes costs by locomotive crane, power haul and portable belt conveyor. By the first he calculates cost (including interest and depreciation) at 8½ cents to 12 cents per ton for handling 100 tons a year and 50 tons respectively.

For smaller amounts he recommends a belt conveyor, and gives an illustration of a concern that uses 4,500 tons a year and piles it by this method. It used a 31-foot Link Belt conveyor, which, set at an angle of 30 degrees, piles 13 feet 6 inches high; but was set to pile only 8 feet high and backed away from the pile as the coal was stored. The annual cost was $208.20 for depreciation (at 20 per cent), $31.26 interest (at 6 per cent), $50 for upkeep, and $25 for electric power, and $90 for labor unloading 90 cars. This totals $404.46, or a little less than 9 cents per ton.

ASPHALT MACADAM BASE

The Asphalt Association has prepared for distribution specifications for asphalt-macadam base, penetration method, accompanied by a notice to engineers that certain features should be modified to adapt them to the conditions of individual cases. Special reference is made to the thickness, nature of coarse aggregate, use of crushed gravel, "penetration" of asphalt cement, and use of pressure distributors. Specifications are also furnished for asphalt-macadam surface course. These are revised for 1924, and may be had on application to the association.

NEWS OF THE SOCIETIES

CALENDAR

Sept. 2-4—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Annual convention at Sharon, Pa. Secretary, Fred H. Gates, Wilkes-Barre.

Sept. 15-18—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention, Topeka, Kan. (Tentative date). Secretary, R. D. Morgan, Mexia, Tex.

Sept. 23-25— CITY MANAGERS' ASSOCIATION. Eleventh annual convention, Montreal, Que., Can. Executive secretary, John G. Stutz, Lawrence, Kan.

Sept. 29-Oct. 3—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention at Hotel Copley Plaza, Boston, Mass.

Sept. 30-Oct. 1-3—NEW ENGLAND WATER WORKS ASSOCIATION. Annual convention at Powers Hotel, Rochester, N. Y. Secretary, Frank J. Gifford, Boston, Mass.

Oct. 6-9 — SOUTHWEST WATER WORKS ASSOCIATION. Annual convention at Topeka, Kans.

Oct. 6-10—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention at Monterey, Calif. Secretary, Wm. J. Locke, Pacific Bldg., San Francisco.

October 8-10—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention at Emporia. Secretary. John G. Stutz, University of Kansas, Lawrence, Kan.

Oct. 14-17—NATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Partridge Inn, Augusta, Ga. Secretary, William R. Arbuckle, supt. fire alarm, Bayonne, N. J.

Oct. 16-17—OHIO STATE CONFERENCE ON CITY PLANNING. Annual conference at Columbus, O. Secretary, Charlotte Rumbold, Chamber of Commerce Bldg., Cleveland.

Oct. 20-23 — AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting at Detroit, Mich. Secretary, Homer N. Calver, 370 Seventh Ave., New York.

Nov. 10-18—NATIONAL MUNICIPAL LEAGUE. Annual meeting at Harvard University, Cambridge, Mass.

Nov. 17-19—ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting at San Francisco.

November—NORTH CAROLINA SECTION, AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Charlotte, N. C. Secretary, Thorndike Saville, University of North Carolina, Chapel Hill, N. C.

Jan. 6-9. 1925—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention and road show at Chicago, Ill.

ROAD SHOW AND A. R. B. A. CONVENTION

The 1925 Road Show and Convention of the American Road Builders' Association will be held at Chicago, January 5 to 9, inclusive. C. M. Upham, business director of the Association, announces that much better arrangements have been made for both the show and convention than in any previous years. The preliminary plans also are already as far along as has been usual at a much later date. Every indication therefore is that these two big annual events in the road building industry will in every way eclipse all past records.

The program committee which will have charge of the convention will be headed by Prof. T. R. Agg. He expects to have the organization of his committee completed soon. Professor Agg has had such a variety of experience in the highway field that he will be able to produce a well-balanced program of general interest. The convention sessions will be held at the Congress Hotel.

Nearly 17,000 square feet of additional floor space suitable for heavy exhibits will be provided at the Coliseum. This additional space is being obtained by the extension of the Coliseum to the north. The present main building and the adjoining building which have been used in the past also will be available. There will thus be room for more and better exhibits than in the past.

Additional doors for bringing in the heavy exhibits also have been arranged. Plenty of time to get the exhibits into the buildings further will be allowed by the schedules made possible by the dates of the show. These improved arrangements coupled with the wonderful success of the last two road shows insure the largest and best industrial machinery exposition ever seen in this country.

Application blanks for space in the Road Show will be mailed shortly by Mr. Upham to all concerns whose names are available. Additional blanks may be obtained by addressing him at 37 West 39th Street, New York City.

Committees are being formed to handle the annual banquet, hotel arrangements, registration and various other features. The plans for these features, as well as for the show and convention, will all be arranged long in advance of what has been customary in previous years. With greater interest in highway building than ever before, the attendance from all parts of the country thus is certain to break the remarkable records of the last show and convention.

NEW JERSEY STATE HIGHWAY ASSOCIATION

The annual outing of this association will be held at the Fair Grounds, Trenton, N. J., on Sepetember 6th. All Highway Department employees, contractors, material men and commissioners are expected to be present. Sports, eating and "getting together" are the chief attractions offered.

AMERICAN ASSOCIATION OF ENGINEERS

Offices of the association were opened July 15 at 712 Investment Bldg., 15th and K Streets, Washington, D. C., in charge of A. B. McDaniel. The association expects to become useful as a medium of fact finding or research and "to help in the articulation of business, politics and engineering." Among the topics that probably will be taken up are: A Federal Bureau of Public Works; Thrift and Economy in Federal Administration; Development of Land and Water Resources; Bureau of Domestic Commerce; Allocation of Patent Office to the Department of Commerce.

It is expected that the association will contract with an old line life, health and accident insurance company for insurance for its members at wholesale rates substantially lower than can be obtained by individual engineers who are not members of the association.

SOUTHWEST WATER WORKS ASSOCIATION

The annual convention of the Southwest Water Works Association will be held in Topeka, October 6th to 9th, overlapping two days with the convention of the League of Kansas Municipalities at Emporia. W. A. Stanfield, Commissioner of Water and Light of the City of Topeka, is in charge of the local arrangement.

SOCIETIES SUPPORT "MANAGEMENT WEEK"

The American Society of Mechanical Engineers, National Association of Cost Accountants, Society of Industrial Engineers, Taylor Society, and American Management Association are supporting "Management Week," October 20 to 25, the slogan for which is "Better Management Through Budgeting." Arrangements are being made for meetings in 65 cities, also in schools and colleges, and to broadcast talks on some phase of management from the large stations of the country.

INTERNATIONAL CONFERENCE OF SANITARY ENGINEERS

This conference, organized by the Institution of Sanitary Engineers of England, met July 7th to 10th, at the Royal United Service Institution, Whitehall. The program contained 42 papers, of which 15 were by American sanitarians, 15 by English and 12 by representatives from France, Holland, Sweden and other countries.

The Americans who presented papers were W. L. Stevenson, chief engineer of the Department of Health of Pennsylvania; J. A. Le Prince, senior sanitary engineer, U. S. Public Health Service; R. E. Tarbett, sanitary engineer, U. S. Public Health Service; J. A. Wilson, consulting chemist, Sewerage Commission of Milwaukee; John C. McVea, city engineer, Houston, Texas; T. Chalkley Hatton, chief engineer, Sewerage Commission of Milwaukee; Langdon Pearse, sanitary engineer, Sanitary District of Chicago; Victor H. Kodish, assistant to chief engineer, Sewerage District of Milwaukee; Harrison P. Eddy, consulting engineer; W. C. Groeninger, past president, Am. Soc. of Sanitary Engineering; Prof. Geo. C. Whipple, Howard University; John S. Hodgson, Washington, D. C.; Thos. J. Classy, Chicago, and Samuel A. Greeley, consulting engineer, Chicago.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

STOKERS FOR SMALL FURNACES

The Stoker Sales Co., of Chicago, has recently placed on the market a new "King Cole" stoker, designed by Joseph Harrington for units of 250 h.p. or less, to enable them to burn high volatile coals without smoke and with high efficiency. It is claimed to decrease fuel costs through ability to burn cheaper coals, to decrease the amount of coal consumed, reduce the volume of ash and completely eliminate smoke.

There are four grates, one above the other in terraces, the first and third sliding back and forth, the second and fourth stationary. The coal is fed by a reciprocating plate, forming the base of the coal hopper, that has a travel up to 5 inches.

The stoker is operated by motor or hydraulic drive of ¼ horsepower only, there being only three moving parts in the entire mechanism.

KOEHRING HEAVY-DUTY MIXER

The Koehring Company, of Milwaukee, has brought out a three-level operating control for its No. 21S heavy-duty construction mixer when batch hopper is equipped. The contractor can choose bottom or ground control, intermediate, or overhead control. This gives the mixer more versatility when working in crowded quarters or where a single, ground control would be inadequate. The overhead platform, incorporated when specified, is convenient when the mixer is in a depression or when using overhead bins.

The intermediate platform brings the control point at the top of the batch hopper waist high to the operator, which lightens the task of feeding the cement into the hopper by the operator.

A cast steel pivoted, swinging type batch hopper gate, with an opening 11 in. by 20 in., replaces the old sliding gate. This gate affords no chance for the materials to lodge in the opening, and the materials can be charged into the drum in 15 seconds.

The mixer is mounted on either skids or regular steel rim wheels. A choice of steam, gasoline or electricity is offered.

EDSON MANHOLE PUMP

The Edson Manufacturing Corporation of Boston, Mass., offers to municipalities, contractors and public service companies a pump mounted on a trailer which was designed by telephone engineers for use in pumping out manholes, but would be appropriate for any work calling for the use of a diaphragm pump at points scattered throughout a city or other district.

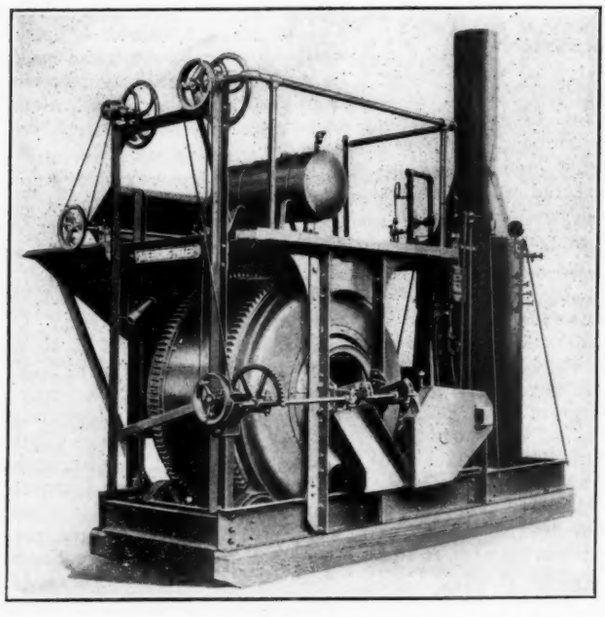
The outfit consists of the Edson Regulation "On Top" pump unit with some recent improvements, the operating gasoline engine being air-cooled and provided with high tension Bosch magneto ignition, while the pump has been redesigned so as to give somewhat greater efficiency. The pump is mounted on a trailer which is mounted on two standard front Ford wheels, permitting it to be carried behind an automobile or truck without damage to the pump. The illustration shows the trailer standing on end with the pump in position for operation, the wheels being clear of the ground in this position. For a short distance, as from one manhole to the next, the trailer can be drawn by one man.

RED LEAD-GRAPHITE PRIMER

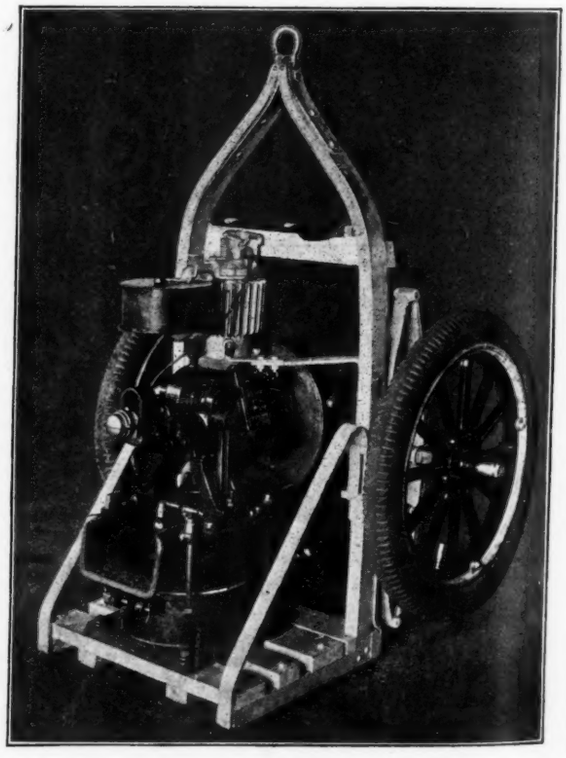
The Joseph Dixon Crucible Company, Jersey City, N. J., manufacturers of Dixon's silica-graphite paint, have placed on the market another paint product known as Dixon's red lead-graphite primer. For over a year it has been subjected to tests under usual conditions by practical painters and found to meet the most rigid requirements.

The pigment of this primer consists of flake silica-graphite, red lead and high grade oxide of iron. The vehicle is the best boiled linseed oil obtainable. The

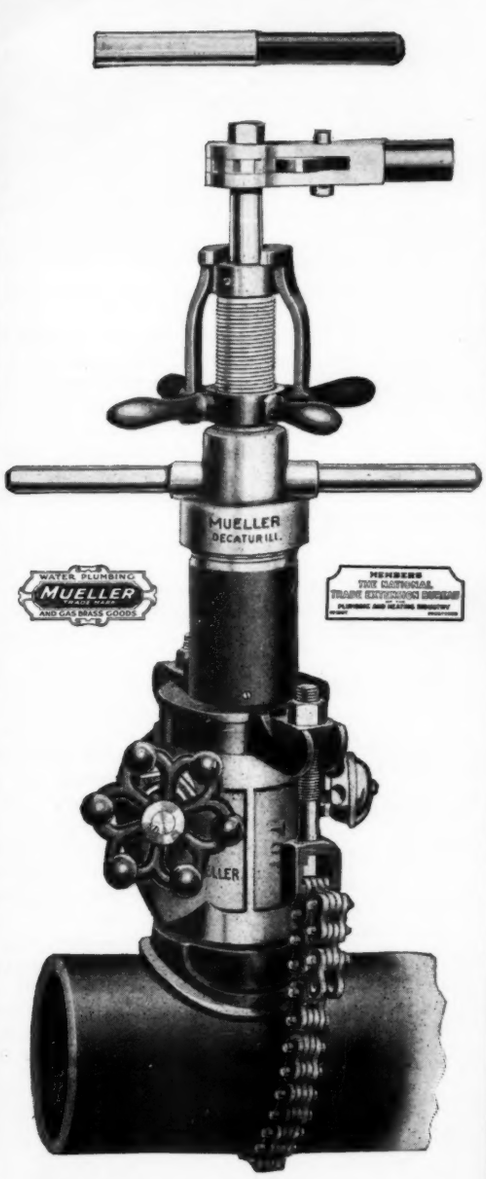
(*Continued on page 44*)



CONTROL.
KOEHRING 21S HEAVY DUTY MIXER, OVERHEAD



EDSON PUMP MOUNTED ON TRAILER, IN POSITION FOR PUMPING.



MUELLER No. "A" Water Tapping Machine

is designed for tapping water mains and inserting corporation cocks under pressure, from 1" to 2" in size. The "A" Machine embodies the latest improvements and represents the most approved practice in both construction and operation.

Increased Dividends for You

The sure way for Public Service Companies to increase dividends is to reduce operating costs. You can materially reduce your tapping costs by using Mueller Tapping Machines and Tools—because they embody the results of over sixty years of practical experience.

MUELLER Tapping Machine No. "A"

will tap water mains and insert corporation stops from 1″ to 2″ in size, in pipe under pressure. Other models of Mueller Tapping Machines specially designed for different conditions. More than 90% of all tapping machines in use today are Mueller-made. Write for complete descriptions and prices.

Mueller Co.
Decatur, Ill., U. S. A.

145-149 W. 30th St., New York; 1072 76 Howard St., San Francisco; 2468 Hunter St., Los Angeles

(Continued from page 42)
primer will dry perfectly in 22 hours under normal conditions. It will cover approximately 400 square feet to the gallon on metal surfaces.

The manufacturers claim that Dixon's red lead-graphite primer has the good qualities of red lead together with the well known water-repellent advantages of a high grade silica-graphite paint; that under application it lessens the "drag" on the painter's arm and is not so severe on the wearing qualities of the brush as red lead; that it will not chip nor scale off, has greater covering power than red lead, and costs considerably less; and that it fully meets the needs of those who perfer a red lead paint for priming coats.

RAM'S HORN METER FRAME

The Ford Meter Box Co., of Wabash, Ind., makes a meter holding frame that it calls the "Ram's Horn," for "instaling water meters in a better and more rigid manner at a cost that is less than that of ordinary fittings." They take any standard make of meter. The joints are made by compression only and the meters are quickly and easily sealed. They offer practically no resistance to the flow of water. They are tested to 200 pounds pressure. When those having test valves are used it is possible, by opening this valve, to test the meter in a few seconds to see whether it is alive or dead.

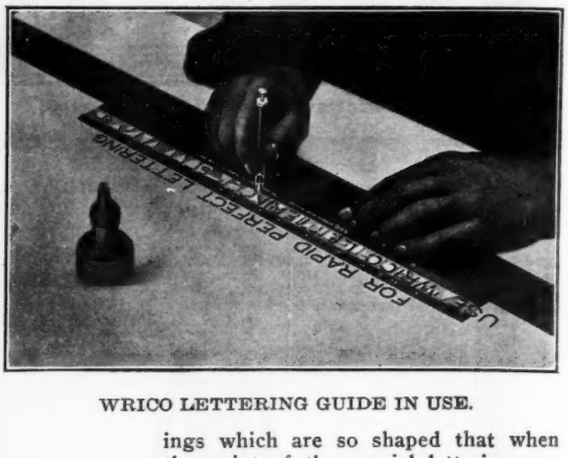
They are furnished for ⅝ inch standard and bastard meters, and ¾ inch meters, with or without test valves and with or without unions. All are tapped for ¾ inch pipe connections unless otherwise ordered.

MANDT REFUSE BODY

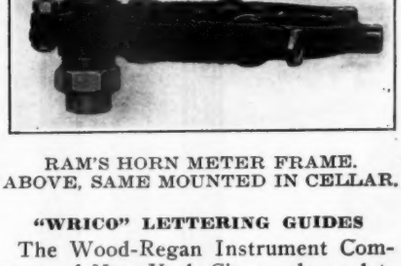
The Mandt Company, of Keokuk, Iowa, manufactures automatic dump bodies for special purposes, including collection of garbage and refuse. This body is of steel, water-tight and sanitary, and dumps the entire load without help. It is made in two sizes, one for truck with 60 in. or less back of the cab, like Fords; the other with 75 in. or less, like Chevrolets. They are furnished either with or without steel hinged tops.

The capacities of the two sizes are, for the smaller, 38 cubic feet without covers, and 48 cubic feet with covers; and for the larger, 2 cubic feet greater. The smaller is 50 in. wide and 74 in. long over all; the larger, 54 in. by 86 in. The loading height above the ground is 56 in. The weight without covers is 559 pounds for the smaller and 840 pounds for the larger, and with covers 859 pounds and 1,190 pounds, respectively.

These dump bodies are of the roll-over type, eliminating dumping shock. When filled they are balanced so that they dump by merely pulling an unlocking lever from the driver's seat.



WRICO LETTERING GUIDE IN USE.



RAM'S HORN METER FRAME. ABOVE, SAME MOUNTED IN CELLAR.

"WRICO" LETTERING GUIDES

The Wood-Regan Instrument Company, of New York City, makes a lettering guide which it claims, makes it possible for even inexperienced persons to produce good lettering on drawings, maps, etc., at a speed greater than is possible with freehand lettering.

The guide consists of a strip of highly seasoned, transparent green pyralin perforated with various openings which are so shaped that when the point of the special lettering pen is moved in contact with the sides the letters of the alphabet, numerals, etc., are formed. No guide line, retouching or filling in is required. Ample clearance on the under side prevents ink from being smeared when the guide is moved.

For some letters a single opening suffices, for the others two complementary openings are used. The amount of shifts between complementary openings is the same for all characters and is automatically regulated by a shift button at the end of the guide.

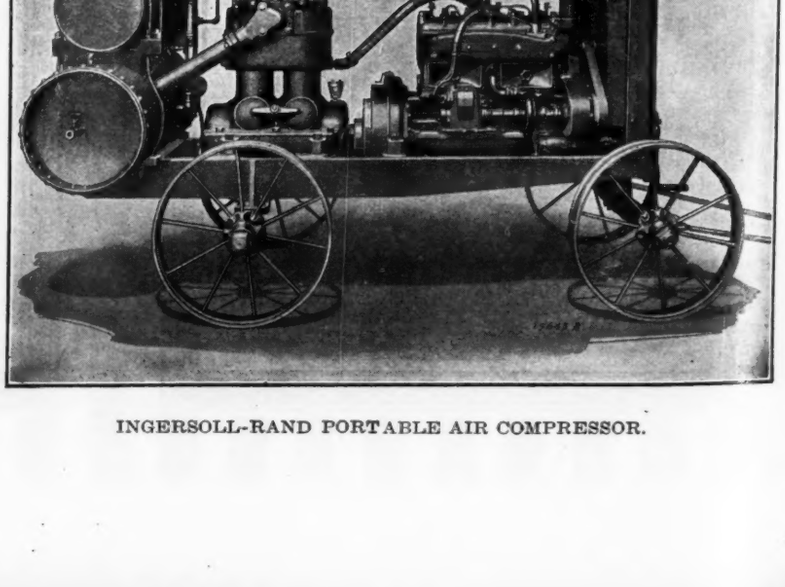
The lettering pen, specially designed for this work, is a fountain pen with a tubular point, the flow from which is regulated by means of a plunger. Different sizes of pen give light or heavy lines, as desired.

Lettering guides are provided for eight different sizes of letters, and five grades of pens are used for as many thicknesses of line.

INGERSOLL-RAND PORTABLE AIR COMPRESSOR

A small portable air compressor plant of modern design and construction has

(Continued on page 46)



INGERSOLL-RAND PORTABLE AIR COMPRESSOR.

LAMBERT FROST PROOF METER

The Measure of true value in a water meter

The certainty of performance, the long and uninterrupted service for which the LAMBERT METER is particularly noted, tell the water works engineer of today what he most wants to know—the value that is built into a meter.

When a meter embodies unusual engineering achievement; when it is the product of experience, when it yields the unbroken service which LAMBERT users prize so highly, can more conclusive evidence of value be supplied?

Money Never Bought More in a Meter

Catalogue showing full line of meters for every requirement for the asking.

THOMSON METER COMPANY

100-110 Bridge Street Brooklyn, N. Y.

LAMBERT

FROST PROOF METERS

been developed by the Ingersoll-Rand Company, of New York. This plant, designated as the 4¼" x 4" Type Twenty, has a piston displacement of 60 cu. ft. per minute and is built along the same lines as the larger compressors of this type, with duplex, vertical compressor, direct-connected to a 4-cylinder, 4-cycle, tractor-type gasoline engine; circulating water cooling system for engine and compressor with sectionalized radiator, fan and pump; compressor regulator and engine control for reducing speed during unloaded periods; one-piece cast steel frame; sheet steel roof and removable side doors.

The compressor can be furnished mounted on steel wheels, wooden artillery wheels, a Ford truck, or on skids for mounting on a car or truck. It is furnished with either gasoline engine or electric motor drive. It will operate, in general service, one BAR33 "Jackhamer" rock drill, or one CC25 paving breaker, or one 56H clay or trench digger, or two 22SR backfill tampers, or two calking or chipping hammers, or one No. 90 riveting hammer.

INDUSTRIAL NOTES

CATERPILLAR DISTRIBUTORS

The Holt Manufacturing Company announces the appointment of the Holt Texas Equipment Company, 217-221 S. Market St., Dallas, Tex., as its distributors for Caterpillar tractors in the state of Texas. The president of the company is R. S. Lowe of Dallas, and associated with him are a number of salesmen formerly connected with the Holt Company of Texas, previously the Texas distributors of Caterpillars. Complete stocks of Caterpillar tractors and service parts are carried in Dallas and at other points in the state.

For southern Minnesota and western Wisconsin, the "Highway Supply Company" of 417 Washington Avenue N., Minneapolis, has been appointed as distributor. This address is that of the quarters previously occupied by the Minneapolis branch of the Holt Manufacturing Company. The Highway Supply Company has had long exerience in the sale of tractive and other road machinery and has a wide acquaintance among county and city officials, contractors and other users of tractors. For eastern Massachusetts, Vermont, New Hamshire and Rhode Island, the Dyar Sales & Machinery Company of 66 Broadway, Cambridge, Mass., has been appointed distributor. This company has been engaged in the sale of contractors' equipment for many years.

WELSBACH STREET LIGHTING CO.

The Welsbach Street Lighting Company, of Philadelphia, Pa., which for over twenty-five years has specialized in gas street lighting, intends to extend its services to include electric street lighting. Through co-operation with the principal electric industries and Central Station Companies it will undertake to give municipalities the most efficient and economical street lighting service possible.

It has secured the services of the former electrical engineer of the District of Columbia, Walter C. Allen, who had charge of the street lighting system in that District for over twenty-two years. Mr. Allen will have immediate charge of the new branch of the Welsbach Company's operations.

ASPHALT ASSOCIATION FIELD ENGINEERS

Changes in field personnel and consolidation of the Newark, N. J., branch office with the main office in New York City are announced by the Asphalt Association. Vibert L. Ostrander, formerly first deputy commissioner, New York State Highway Department, becomes manager of the Eastern District with headquarters at 25 North Pearl Street, Albany, N. Y., to succeed Germain P. Graham, who has resigned to enter private practice. Frederick A. Reimer has resigned as manager of the New Jersey District to enter private business, and W. C. Ricketts has succeeded Harry P. Grier as a field representative in the Southern District with headquarters at Charlotte, N. C. W. A. Crossland also has accepted a position with the Southern branch. Frederick C. Field, until recently with the city engineering department at Calgary, Canada, has been appointed field representative in Canada, traveling out of the main office in New York.

DE LAVAL REPRESENTATIVES

The De Laval Steam Turbine Co., of Trenton, N. J., will be represented in the northern part of Minnesota and Wisconsin and the northern peninsula of Michigan by the Wm. Constable Co., Providence Building, Duluth, Minn.

G. C. Kahl, 404 Dwight Bldg., Kansas City, Mo., has been appointed sales representative in Arkansas, Nebraska, Kansas, Oklahoma, Western Iowa and Western Missouri.

CHANGE IN LINK-BELT COMPANY ORGANIZATION

At the Board meeting of the Link-Belt Co., on July 24th, on the suggestion of the president, Charles Piez, a change was made in the organization. The chairman of the Board was made the chief executive officer of the company, and an executive committee of four was created to act in an advisory capacity to the officers. Mr. Piez was elected chairman of the board and also of the executive committee. Alfred Kauffman, newly elected president; Staunton B. Peck, senior vice-president, and Thomas B. Marston, a member of the Board of Directors, are the other three members of the executive committee.

"HEX-TOP" GREASE CUP

A compression grease cup is being manufactured by the Link-Belt Company, of Chicago, which has a top hexagonal in shape, thus providing a grip for a wrench, and also with a raised slot so it can be turned with a screwdriver. The name given it is the "Hex-top" grease cup.

NEW P. & H. REPRESENTATIVE

The Pawling & Harnischfeger Company of Milwaukee announces that it has engaged P. H. Sackett to represent it in Minnesota and North and South Dakota. His office will be at 3445 Hennepin Avenue, Minneapolis. Any requests for information or any business matters covering P. & H. traveling cranes, gasoline power shovels, draglines, clamshells or trenching machinery will be handled in that territory by Mr. Sackett.

PERSONALS

Morrison, Roger L., treasurer and general manager of the Concrete Products Company of Birmingham and formerly professor of highway engineering at the A. & M. College of Texas, has been appointed associate professor of highway engineering and director of the Michigan State Laboratory at the University of Michigan.

Johnson, Martin, has been appointed city engineer and superintendent of water works of Rhinelander, Wis.

Watkins, J. S., formerly district engineer for the Kentucky Highway Department, has succeeded Mr. Potts as assistant engineer of construction.

McClintock, James Y., at one time city engineer of Rochester, N. Y., and for 17 years superintendent of highways for Monroe County, New York, died recently, aged 71 years.

Upham, Chas. M., State Highway Engineer of North Carolina, has been appointed director of the Advistory Board on Highway Research of the National Research Council, succeeding Dr. W. K. Hatt.

Muth, Frank A., secretary of the Louisiana Engineering Society and of the Louisiana section of the American Society of Civil Engineers, has been chosen by the Commission Council of New Orleans to take charge of the revision of that city's building code.

Dunlap, John H., secretary of the American Society of Civil Engineers, died on July 29 at Chicago as a result of injuries received in a railroad accident on June 30 when returning from the annual convention of that society at Pasadena, Calif., and from a committee meeting of the Society for the Promotion of Engineering Education.

Potts, W. H., formerly assistant engineer of construction with the Kentucky Highway Department, has been appointed engineer of surveys and plans for that department, the first to occupy this newly created position.

NEWS OF THE SOCIETIES

CALENDAR

Sept. 23-25—CITY MANAGERS' ASSOCIATION. Eleventh annual convention, Montreal, Que., Can. Executive secretary, John G. Stutz, Lawrence, Kan.

Sept. 29-Oct. 3—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention at Hotel Copley Plaza, Boston, Mass.

Sept. 30-Oct. 1-3—NEW ENGLAND WATER WORKS ASSOCIATION. Annual convention at Powers Hotel, Rochester, N. Y. Secretary, Frank J. Gifford, Boston, Mass.

Oct. 6—MASSACHUSETTS FEDERATION OF PLANNING BOARDS. Annual conference at Worcester, Mass. Secretary, Arthur C. Comey, Abbot Bldg., Cambridge, Mass.

Oct. 6-9 — SOUTHWEST WATER WORKS ASSOCIATION. Annual convention at Topeka, Kans.

Oct. 6-10—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention at Monterey, Calif. Secretary, Wm. J. Locke, Pacific Bldg., San Francisco.

October 8-10—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention at Emporia. Secretary. John G. Stutz, University of Kansas, Lawrence, Kan.

Oct. 14-17—NATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Partridge Inn, Augusta, Ga. Secretary, William R. Arbuckle, supt. fire alarm, Bayonne, N. J.

Oct. 16-17—OHIO STATE CONFERENCE ON CITY PLANNING. Annual conference at Columbus, O. Secretary, Charlotte Rumbold, Chamber of Commerce Bldg., Cleveland.

Oct. 20-23 — AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting at Detroit, Mich. Secretary, Homer N. Calver, 370 Seventh Ave., New York.

Oct. 22-25—AMERICAN SOCIETY OF CIVIL ENGINEERS. Fall meeting at Hotel Tuller, Detroit, Mich.

Nov. 4-7—TEXAS ASSOCIATION OF SANITARIANS. Annual school in cooperation with State Board of Health, at Houston, Texas.

Nov. 10-18—NATIONAL MUNICIPAL LEAGUE. Annual meeting at Harvard University, Cambridge, Mass.

Nov. 17-19—ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting at San Francisco.

November—NORTH CAROLINA SECTION, AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Charlotte, N. C. Secretary, Thorndike Saville, University of North Carolina, Chapel Hill, N. C.

Jan. 6-9, 1925—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention and road show at Chicago, Ill.

Jan. 21-23—AMERICAN SOCIETY OF CIVIL ENGINEERS. Anual meeting at New York, N. Y.

NEW ENGLAND WATERWORKS CONVENTION

An exhibit of products will, as usual, be shown at the convention of the New England Waterworks' Association in Rochester, N. Y., September 30 to October 3. We are informed by J. E. O'Leary, chairman of the Exhibit Committee of the Waterworks' Manufacturers' Association, that the following expect to exhibit their products at the convention:

Neptune Meter Company; Lap Joint Impervious Company; Fire and Water Engineering; Thomson Meter Company; Geo. A. Caldwell Company; Central Foundry Company; Union Water Meter Company; The American City; Kennedy Valve Manufacturing Company; Water Works Equipment Company; The Pitometer Company; Builders Iron Foundry; Red Hed Manufacturing Company; National Meter Company; Lead Lined Iron Pipe Company; Engineering News-Record; National Tube Company; Hays Manufacturing Company; McWane Cast Iron Pipe Company; Hersey Manufacturing Company; Lock Joint Pipe Company; Paradon Engineering Company; Eddy Valve Company; R. D. Wood & Company; Wallace & Tiernan Company; National Water Main Cleaning Company; U. S. Cast Iron Pipe & Foundry Company; Pittsburgh Meter Company; Engineering & Contracting; Rensselaer Valve Company; Public Works; Mueller Company, Inc.; Bingham & Taylor; Worthington Pump & Machinery Corporation; Ford Meter Box Company; Edson Manufacturing Company; and Pittsburgh Des Moines Steel Company.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA

This society held a special meeting on September 8 at Pittsburgh. Lieut. John A. Macready, of the Engineering Division of the Army Air Service stationed at Dayton, Ohio, gave a talk before the society on "Engineering Aspects of Flying."

WESTERN SOCIETY OF STATE HIGHWAY OFFICIALS

This society at its annual meeting elected as officers for the following year: For president, G. W. Borden, Nevada state highway engineer; for vice-president, Roy Klein, Oregon state highway engineer; and for secretary, Z. E. Sevison, Wyoming state highway engineer.

Seven papers were read and discussed dealing with gravel roads, surety bonds, forest highway standards, national park roads and their construction, and timber bridges.

AMERICAN SOCIETY FOR STEEL TREATING

The annual convention of this society will be held in Boston, September 22 to 26. A special feature will be a large exposition of materials and devices for heat treating, which will be held at Commonwealth Pier, South Boston. The headquarters of the convention will be at the Copley-Plaza Hotel.

JOINT SMOKER IN BOSTON

One of the features of the convention of the American Society for Municipal Improvements will be a joint smoker to be held on September 30 by that society, the Boston Society of Civil Engineers and the local section of the American Society of Civil Engineers. The program will include the presentation of a new motion picture on "Power," depicting the development of steam power up to its present stage, furnished through the courtesy of Stone & Webster. Other entertainment features are being arranged by the Boston Society of Civil Enginers.

AMERICAN SOCIETY OF CIVIL ENGINEERS

A Fall meeting of this society will be held in Detroit, Mich., October 22 to 25, the Hotel Tuller being headquarters. In addition to the technical sections, there will be excursions to industrial plants and other points of engineering interest.

On Wednesday afternoon, preliminary to the official opening of the meeting, there will be a joint session of the Sanitary Engineering Division with the Laboratory Section of the American Public Health Association. On October 23 there will be discussion of a paper by F. C. Shenehon entitled "The St. Lawrence Deep Waterway to the Sea." Following this discussion there will be an informal dinner and social evening.

Friday morning will be devoted to simultaneous meetings of the technical divisions of the society, four of which have arranged programs as follows: Power Division—"The Work of the Committee on Ice Trouble at Hydroelectric Plants." Sanitary Engineering Division—"Recent Developments in English Sewage Treatment"; "Treatment of Sewage at Chicago"; "Sewage Disposal and Water Supply Problems in the Detroit Area." City Planning Division—"Factors in the Zoning of Cities." Highway Division—"Highway Transportation in Pennsylvania"; "Traffic Regulation on State Highways."

Friday afternoon will be occupied with excursions to plants or works selected by the individual engineers, after which the members will be entertained at a dinner at the Detroit Yacht Club. On Saturday morning the members may choose between attending a meeting of the City Planning Division and an all-day excursion to Ann Harbor, Mich.

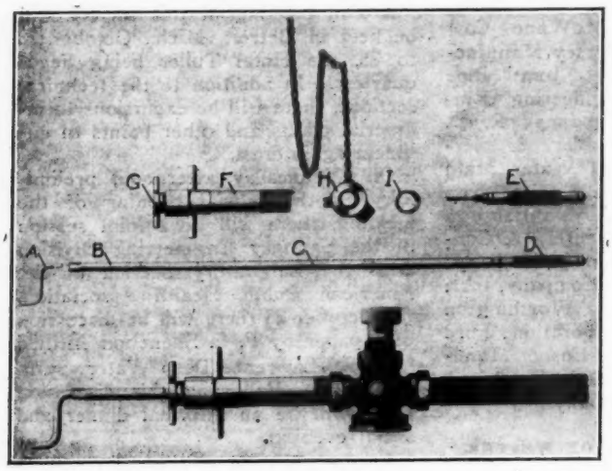
The second canvass of ballots for nominees was taken on August 15, and the official nominees were found to be as follows: For president, Robert Ridgway; for vice-president Zone 2, Richard L. Humphrey; for vice-president Zone 3, Milo S. Ketchum; for director District 1, W. T. Chevalier; for director District 2, C. N. Spofford; for director District 6, A. R. Raymer; for director District 10, P. H. Norcross; for director District 13, H. D. Dewell.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

FORD SERVICE PLUG

The Ford Meter Box Company, of Wabash, Ind., makes, for the use of water works superintendents, a device to facilitate replacing a water service stop cock without digging up the street to close the corporation cock or shutting off the main. It is made for use with only ⅝ and ¾ inch round way stops. It is operated as follows:



FORD SERVICE PLUG AND PARTS OF SAME.
List of Parts: A—Crank. B—Stem nut. C—Stem. D—Packer head, ⅝ inch. E—Packer head, ¾ inch. F—Housing chamber. G—Packing gland. H—Adapter with chain. I—Adapter bushing. Pull rod, inside (not shown).

First, a packer head of proper size for the pipe upon which it is to be used, is attached to stem. This stem is then drawn back so that packer head is entirely housed in housing chamber. Then with stop shut off, housing chamber is screwed in to stop and cock opened. Packer stem is then pushed into pipe, through cock, so that packer head is well back of stop. Packer head is then expanded, by turning crank at head of stem, until it takes firm hold upon inside of pipe. When this is done, the housing chamber is unscrewed from stop cock and withdrawn, leaving stem in position. Stop cock may now be removed and a new one placed in position. After this is done, housing chamber is slipped back over packer stem and screwed into stop. Packer head is then released by reverse movement of crank and stem withdrawn, so that packer head is clear back within housing. Stop is then shut off and service packer removed. Thus whole job is done, without undue expense incident to shutting off main and without digging up street. Neither is there any annoyance from water, as none is wasted

It is sometimes found that threads on end of service pipe have become rusted and new threads must be cut. This sometimes means that a burr will be left on the inside of pipe, through use of wheel cutter. This burr must be removed and the company states that it is prepared to supply a special hollow reamer, which is not listed as part of regular equipment and comes as an extra. These are very reasonably priced, however, and are supplied with ratchet handle for easy operation.

An adapter, with chain attachment, is supplied as regular part of the service packer for use in changing wiped joint type of stops.

The illustration shows the several parts of the plug, and the same assembled for use.

LA PLANT-CHOATE "BULL-DOZER"

The La Plant-Choate Manufacturing Company, of Cedar Rapids, Ia., is furnishing an outfit for back-filling trenches, levelling off dumps, or otherwise handling loose material. It consists of a push-blade mounted in front of a tractor, but so far in front that the tractor can stay on firm ground while the blade hangs over the edge of the fill or trench.

The blade is hinged at the top and has two steel runners on the under side so that when the tractor backs away, it will rise and slide back without dragging material with it. Also it can be raised to clear the ground entirely when not in use.

The main frame consists of two 5-inch I-beams 16 feet long, with cross braces front and rear, fastened to the tractor frame on a pivot. The weight of the push blade is balanced by rocks or sand bags on a deck in the rear of the main frame. The front of the frame is elevated by means of a worm gear, drum and cable operated by a hand wheel in the rear of the cab. The push blade is of steel 3 by 8 feet ¼ inch thick, heavily reinforced with angle irons at top and bottom with a truss rod and turn buckle also at the bottom. The lower edge is fitted with a carbon steel grader cutting blade which can be removed for sharpening.

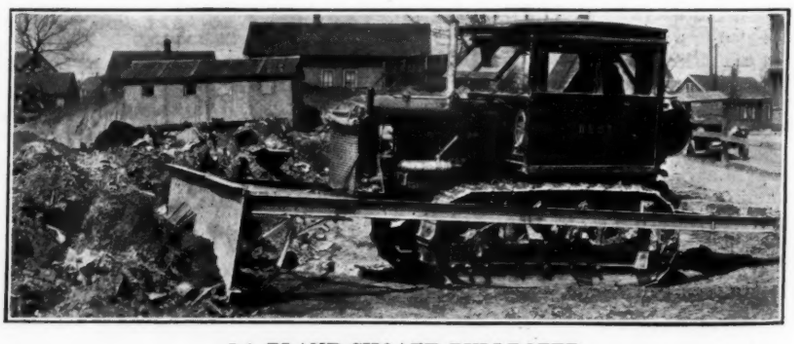
THE MANDT LOADER.

The Mandt Company of Keokuk, Iowa manufactures a loader to be attached to a Fordson tractor which it recommends for grading and loading trucks, also loading sand, gravel or crushed stone, by contractors and road builders, municipalities and others.

The quarter-yard tip-over bucket is filled by being pushed into the pile by the tractor and raised by cable. It can then be swung to either side and dumped into the truck. It is said that the average time for digging a load, raising the shovel, swinging and dumping was 15 seconds on one job. A larger shovel with a half-yard capacity is used for light materials like snow, ashes, loose dirt, etc. The makers claim that it is the fastest snow-cleaning and loading outfit on the market.

A crane can be substituted for the bucket arm, with a capacity to pick up 1,500 pounds ahead and swing it to either side, lifting it 9 feet from the ground.

With a quarter-yard shovel the outfit weighs 1,820 pounds, or 1,970 pounds with a half-yard shovel. The total height over all is 8 feet 8 inches and the extreme width 5 feet 10 inches.



LA PLANT-CHOATE BULLDOZER.

PERSONALS

Madison, J. T., has resigned his position as assistant engineer of the State Highway Department of Kentucky.

Taylor, W. G., formerly deputy chief engineer of the Passaic Valley Sewer Commission, has been appointed sanitary engineer of Paterson, N. J.

Wagner, A. J., formerly chief maintenance engineer with the California Highway Commission, has resigned and since August 1 has been city engineer of Sacramento.

Winslow, G. R., formerly division engineer with the California Highway Commission, has been appointed assistant highway engineer in charge of maintenance.

Compton, R. Keith, formerly chairman and consulting engineer of the Paving Commission of Baltimore, Md., has been appointed director of public works of Richmond, Va.

Bowlby, Col. Henry Lee, senior highway engineer and chief of the War Material Division of the U. S. Bureau of Public Roads, has been appointed chief engineer of the Long Island State Park Commission.

U. S. CIVIL SERVICE EXAMINATIONS

Junior Patent Examiner. Examination October 22 and 23. To fill vacancies in the Patent Office. Entrance salary $1,860 a year; possible increase to $2,400.

Junior Engineer. Examination October 8. To fill vacancies in Bureau of Standards, Bureau of Mines, Bureau of Chemistry and various other branches of Government service. Entrance salary $1,860 a year; possible increase to $2,400.

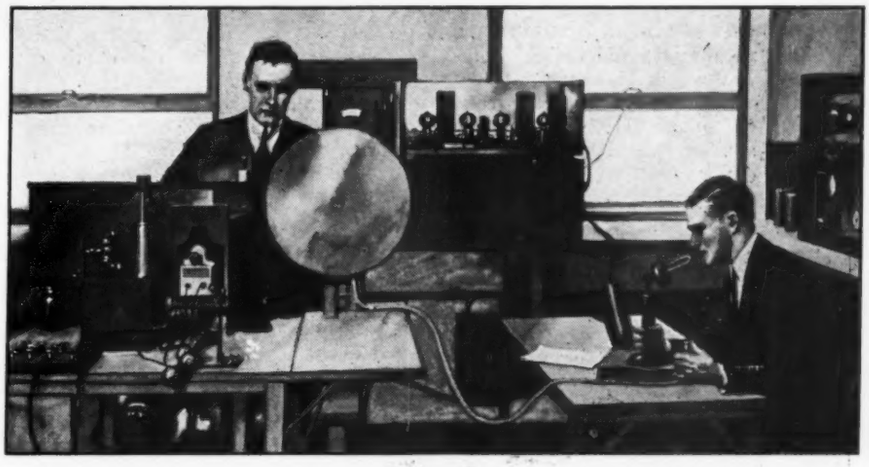
Junior Aid, Grade 1. Examination October 8. To fill vacancies in Bureau of Standards, Department of Commerce. Entrance salary $900 a year; possible increase to $1,260. Required—graduation from 4-year high-school course, including one year's work in two of following subjects: Physics, chemistry or manual training.

Junior Air, Grade 2. Examination October 8. To fill vacancies in Bureau of Standards, Department of Commerce. Entrance salary $1,140 a year; possible increase to $1,500. Required—graduation from 4-year high-school course including one year's work in two of following subjects: Physics, chemistry or manual training, and one semester of college work or six months' experience in testing or research laboratory.

Associate Highway Engineer. Examination September 30. To fill vacancies in Bureau of Public Roads, Department of Agriculture. Entrance salary $3,000 a year; possible increase to $3,600.

Senior Investigating Assistant. Examination October 8. To fill vacancy in Bureau of Efficiency, Washington, D. C., and vacancies in positions requiring similar qualifications. Entrance salary $1,860 a year; possible increase to $2,400. Required—graduation from college or university of recognized standing with courses in business administration, industrial engineering or economics; or, for each college course year lacking may be substituted one year progressive experience in supervision of general office methods, including arrangement and layout of equipment, devising or installing production records, or indexing and filing systems, etc.

Metallurgist ($3,800 to $5,000); Associate Metallurgist ($3,000 to $3,600); Assistant Metallurgist ($2,400 to $3,000). Applications received until September 30. To fill vacancies in Bureau of Mines, Department of the Interior. Required—graduation from institute of recognized standing with bachelor's degree with major work in chemistry, physics, or metallurgy and also specified training and experience.



In the Bell System laboratories speech sounds are recorded on the oscillograph with a view to their subsequent analysis

The service of knowledge

The youthful Alexander Graham Bell, in 1875, was explaining one of his experiments to the American scientist, Joseph Henry. He expressed the belief that he did not have the necessary electrical knowledge to develop it.

"Get it," was the laconic advice.

During this search for knowledge came the discovery that was to be of such incalculable value to mankind.

The search for knowledge in whatever field it might lie has made possible America's supremacy in the art of the telephone.

Many times, in making a national telephone service a reality, this centralized search for knowledge has overcome engineering difficulties and removed scientific limitations that threatened to hamper the development of speech transmission. It is still making available for all the Bell companies inventions and improvements in every type of telephone mechanism.

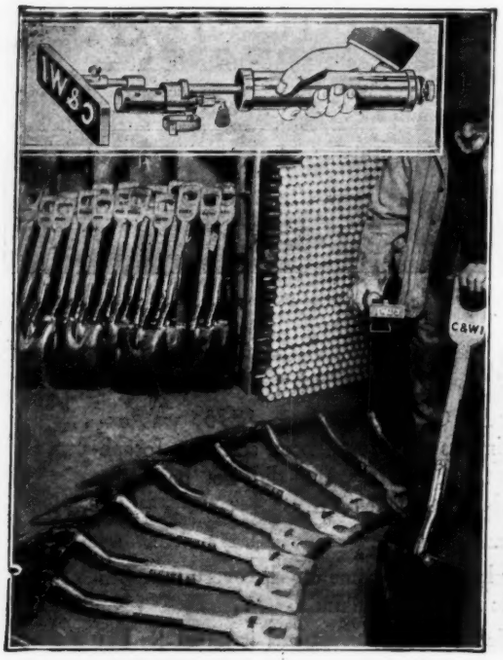
This service of the parent company to its associates, as well as the advice and assistance given in operating, financial and legal matters, enables each company in the Bell System to render a telephone service infinitely cheaper and better than it could as an unrelated local unit.

This service of the parent company has saved hundreds of millions of dollars in first cost of Bell System telephone plant and tens of millions in annual operating expense—of which the public is enjoying the benefits.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

EVERHOT BRANDING OUTFIT.

The Everhot Manufacturing Company of Maywood, Ill., manufactures a branding iron to be used by contractors or others in branding the handles of shovels, picks, wheelbarrows, etc. to prevent theft or other loss. The peculiarity of this iron is that it stays hot and can be used continuously as long as desired, heating being furnished by a gasoline torch which serves also as the handle of the branding iron. The Chicago, Indiana and Western Railway recently branded 60 shovels in 20 minutes while they were being unpacked. The tool can also be used as a soldering iron. Brands are furnished in sizes up to 15 inches by 4 inches, which requires the largest size iron, but the small single burner will heat a brand up to 5¾ x 2¾.



BRANDING SHOVELS WITH AN "EVERHOT."

A NEW FORMGRADER

A new "formgrader" has been brought out by Edward G. Carr, of Chicago, adapted to the new thickened edge cross section of concrete pavement now used in Illinois and elsewhere. This grader uses a Ford automobile engine for power. It will cut a form trench up to 1 foot deep and 1 foot wide as well as the slope-up on the inside; or the form trench can be made 1 foot wide and 6 inches deep, the slope on the inside be cut and the dirt be removed all in one trip.

A rotary cutter is driven immediately in front of the rear wheel, the depth being controlled by a hand wheel and a gauge which runs against a chalk line with hairspring pressure. This gauge is held in position by a pendulum so that any tilting of the machine does not cause variation in the depth of grade below the line.

The machine has a working speed of 15 to 17 feet a minute and a traveling speed of 3 miles an hour. It will cut hard ground to exactly the right grade for supporting the forms, in addition to which soft ground is compacted by the wheel where forms are to be set. The illustration shows a "formgrader" at work on the Duncan Construction Co. job at Champaign, Ill., where this company is laying from 1,000 to 1,400 feet per day of 9-foot pavement.

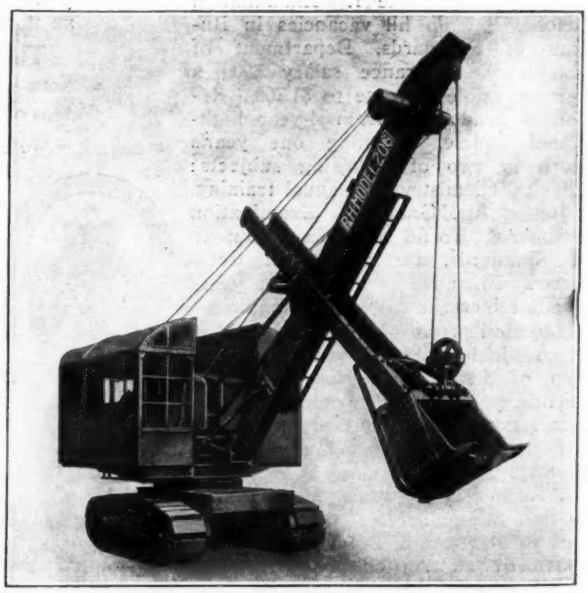
NEW "FORMGRADER."

ROTARY CUTTER

P. & H. MODEL 206 EXCAVATOR

The Pawling & Harnischfeger Co. is now equipping all of its ½-yard and ¾-yard excavators with an all-steel cab of neat appearance which completely protects the main machinery against inclement weather and tampering. The cab is provided with windows on each side of the operator and a swinging steel door on each side of the machine, the doors being provided with latches and locks, while the windows have sheet steel covers which can be slipped into place when the machine is not being used. A rolled sheet cover is placed over the drums and gears with a narrow slot for the cables to lead through, which eliminates the heavy door formerly used and gives better protection.

Another new feature is the substitution of a ¾ yard struck measure dipper instead of the former ¾ yard heap measure dipper. Tests have shown that it is fully capable of the increased capacity furnished by the dipper, the manufacturer giving as the rating 22,000 pounds with a 10-foot radius down to 4,100 pounds with a 35-foot radius, all based on 75% of the overturning load.



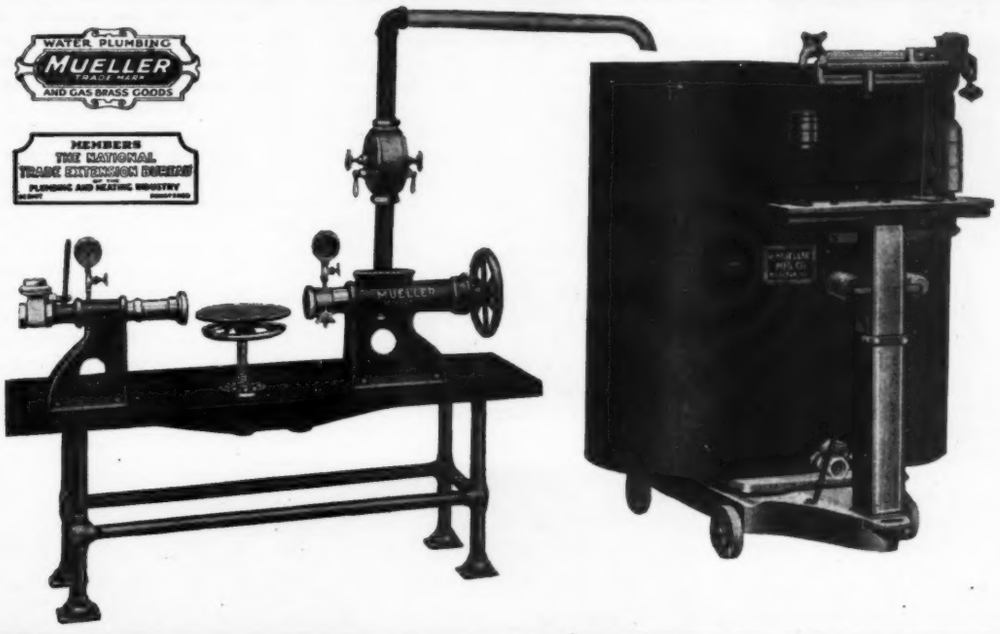
P. & H. EXCAVATOR WITH STEEL CAB.

TRUSCON DOWEL CONTRACTION JOINT

The Truscon Steel Company has recently placed on the market a contraction joint which combines a tongue-and-groove construction, holding the adjoining slabs to uniform surface, and a steel dowel. The plate which forms the tongue-and-groove construction is rolled from 16-gauge steel. Holes in the projecting tongue permit steel pins to be driven through them into the ground, thus holding the plate firmly in position while the concrete is being poured. The plates are punched for dowel bars at 5-foot intervals and are fastened continuously end to end by means of a special clip.

For transverse joints, the plates are placed with the top edge from ½-inch to 1-inch below the surface of the finished road. The concrete is poured in the regular way completely cover-

(*Continued on page 42*)



MUELLER
Water Meter Tester

Good water works practice recognizes the necessity of testing meters before they are installed, as well as periodically thereafter—because an under-registering meter, especially in the larger sizes, means a heavy loss in revenue.

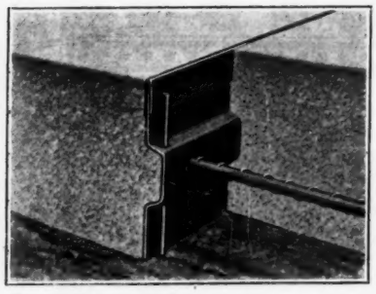
The saving effected by correcting one or two such meters will pay for the entire cost of the Mueller Water Meter Tester within a few months—and it goes on earning dividends indefinitely.

Mueller Water Meter Testers are strongly constructed—the table is cast iron, with wrought iron pipe legs and cast iron head blocks—all exposed parts are nickel plated. Materials and workmanship are first class throughout, and the entire outfit is fully warranted.

Write for complete descriptions and prices.

Mueller Co., Decatur, Ill. U. S. A.

145-149 W. 30th St., New York; 1072-76 Howard St., San Francisco; 2468 Hunter St., Los Angeles



TRUSCON DOWEL CONTRACTION JOINT.

ing the plates, which, therefore, offer no interference with perfect finishing. Contraction of the concrete causes a fine crack to form immediately above the joint plate, and when the joint opens to any extent it is filled with a bituminous material.

When the plate is used for a center or longitudinal joint, a removable cap plate can be placed over the top edge of the contraction plate, filling in the space between the top of the plate and the finished pavement. The concrete is finished flush with the top of this cap plate and allowed to partly set, when the cap plate is removed and the corners of the opening rounded with a double edging tool. The space is later filled with a bituminous material.

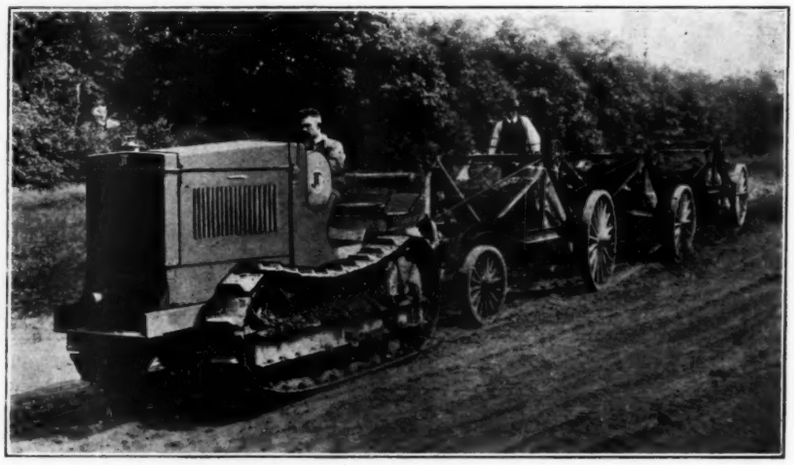
The company also furnishes an installing device which eliminates the necessity of pins for holding the plate in place. This device extends from the side forms to the center joint, securely holding the joint in its proper position. After the concrete has been poured the installing device is removed and the pavement finished in the usual manner. Where marginal bars are used, there is a supporting chair attached to the arm of the installing device which supports the bars and holds them in position until after the concrete has been poured.

BAKER SNOW PLOWS

The Baker Manufacturing Company, of Springfield, Ill., manufactures several types of snow plows, to be attached to auto trucks or tractors, with blades tripping, rigid or V-shaped. The tripping blade was described in our issue of October, 1923. The company now manufactures a frame for attaching either rigid, trip or V-blade to a Fordson.

The plow frame is attached to the tractor by means of three straight bolts and two U-bolts, a few minutes being required to install it. The thrust of the plow is taken directly by the draw bar of the Fordson, the angle frames being bolted at the rear to the draw bar cap and suspended at the front end by means of U-bolts over the cylinder front cover casting of the tractor.

The frame carries either one rigid blade, or a trip blade made in two sections, 6 inches wide, and a moldboard, 7 feet long and 19 inches high, including the blade. The lifting device is a self-locking worm and worm gear arrangement with hand wheel allowing easy operation.



J. T. TRACTOR HAULING THREE ONE-YARD GRADERS.

J. T. TRACTOR

The J. T. Tractor Company, of Cleveland, Ohio, recommends its Model 22 J T Tractor as of the size best suited to fill average requirements. It is of the full crawler type and weighs practically 5 tons when fully equipped and with water, fuel and operator. The engine is a Climax Model KU, 4-cylinder, 40-horsepower. Transmission is of the automobile type, extra heavy, three speeds forward and one reverse. The length is 137 inches over all and the width 60 inches, while the wheel base is 74 inches long. The two crawler units contain 32 hardened steel track shoes in each of the two endless tracks, the length of the crawler unit being 110 inches and the width of track 11 inches, with a ground area of track of 1,628 square inches on soft surface, giving a ground weight of 5 pounds per square inch. The speeds are 1 1/3, 2½, and 4¼ to 5 miles per hour forward, with 1¼ miles reverse. Either gasoline or kerosene may be used as fuel.

A belt pulley attachment may be located on the right front corner or in the rear of the driver's seat, developing a speed of 1,250 feet per minute. A winch may be attached to the rear of frame, a drum 8 inches diameter by 22 inches long holding 1,500 feet of ½-inch cable and pulling 5,000 pounds on a single line. The illustration shows a tractor pulling three 1-yard Maney graders.

CATCH BASIN INLET

The Dubuque Foundry Corporation, of Dubuque, Ia., manufactures a combination curb and gutter catch basin street inlet which is said to admit water in a volume equal to the capacity of an 18-inch pipe. The city of Dubuque has purchased approximately 400 of

(*Continued on page* 44)

BAKER SNOW PLOW FOR FORDSON.

DUBUQUE STREET INLET.

LAMBERT FROST PROOF METER

The Measure of true value in a water meter

The certainty of performance, the long and uninterrupted service for which the LAMBERT METER is particularly noted, tell the water works engineer of today what he most wants to know—the value that is built into a meter.

When a meter embodies unusual engineering achievement; when it is the product of experience, when it yields the unbroken service which LAMBERT users prize so highly, can more conclusive evidence of value be supplied?

Money Never Bought More in a Meter

Catalogue showing full line of meters for every requirement for the asking.

THOMSON METER COMPANY

100-110 Bridge Street **Brooklyn, N. Y.**

LAMBERT

FROST PROOF METERS

these inlets during the past two years, and they have been sold to other cities also throughout the state. They are found to be abundantly strong but at the same time have sufficient clear opening to prevent their choking up as readily as do many other inlets. They are made for gutters of any height from 8 inches to 14 inches. The size of grate section is 15x28 inches, the openings in the curb section 4½x6½ inches. The manhole opening is 18 inches diameter. The cover locks by a quarter turn. The castings are dipped in asphalt iron paint. The weight for 8-inch curb is approximately 400 pounds.

CAREY RAIL FILLER

The Philip Carey Company, of Cincinnati, is putting on the market a rail filler composed of a specially tempered asphalt which acts as a resilient cushion between the rail and the pavement,

CAREY RAIL FILLER

absorbing traffic impact, rail vibration and traffic noise. It is known as the Carey Plastic Rail Filler. It comes to the job ready pre-formed to fit any rail section and is readily shaped to fit any curve of the track. It is made to extend a short distance beyond the rail itself so that the pavement is not laid against the steel rail but against the filler and is thus cushioned against impact from the rail. It is claimed that moisture and temperature changes do not affect it and that it will be durable under all service conditions. The cost of installation is said to be very slight, one man placing it in position with a mallet as his only tool.

INDUSTRIAL NOTES

CHAIN BELT DISTRIBUTOR IN NEW YORK CITY

The Chain Belt Company, of Milwaukee, announces the appointment of the Ginsberg-Penn Company, Inc., as its distributor for the eastern half of the state of New York. This company has just moved to its new quarters at No. 18 East 41st Street, New York City, where it will carry a stock of parts for Rex mixers and pavers and maintain a service department. C. H. Ineson, formerly with the Chain Belt Company in northern New York, has joined the Ginsberg organization. Geo. W. Whitehead Company, of Buffalo, will continue as representative of the Chain Belt Company in western New York.

HOLT DISTRIBUTORS FOR NEBRASKA

The Holt Manufacturing Company announces the appointment of the Omaha Road Equipment Company, of 702 South 10th Street, Omaha, Nebr., as its distributor for caterpillar tractors in the state of Nebraska and the adjacent counties of Iowa. The president of this new company is C. E. Miller, of Omaha. Complete stocks of caterpillar tractors and service parts will be carried by this company.

REPUBLIC TRUCK DISTRIBUTORS

The Republic Motor Truck Co., of Alma, Mich., announces the appointment of Robert S. Taylor as distributor for Republic motor trucks in Seattle, Wash., with salesrooms and well equipped service station at 401 East Pine Street. Distributors have already been established at Long Beach, San Diego, Los Angeles, San Francisco, Portland and Spokane.

NEW P. & H. FOUNDRY.

The Pawling & Harnischfeger Company of Milwaukee announces that it has recently added a large steel foundry to its plant, being the one formerly operated by the Hercules Steel Casting Company. It will now be devoted entirely to steel castings for P. & H. machines and when operating two shifts will be able to turn out all of the 400 tons of carbon steel and alloy steel castings used each month by that company. This will give the company full control of the manufacture of its various equipment from pig iron to finished machine.

THE ANNUAL MUELLER COMPANY PICNIC

The Mueller Company, of Decatur, Ill., gave its annual picnic to its employees on August 23 at Fair View Park, where there were baseball games, other games for children, a baby show, dancing, prizes given for dressmaking, cooking and other diversions; also the giving of cash awards and service buttons to employees who had been with the company five years, ten years, fifteen, twenty, twenty-five, thirty and forty years. Over 5,000 attended the picnic and 267 employees shared in $32,000 paid in bonuses.

BYERS MACHINE COMPANY

The Byers Machine Company, of Ravenna, Ohio, has issued a new 24-page bulletin featuring its Model 10 crane, a full revolving crane of 10-ton capacity, the largest manufactured by this company. Another 16-page bulletin is a treatise on the Truckrane, a light crane furnished unmounted for mounting on a motor truck chassis. Both bulletins are profusely illustrated with photographs of the machines.

The New York representative of the Byers Machine Company, The Ginsberg-Penn Company, has recently moved from 50 Church Street to 18 East 41st Street.

THIRD ANNUAL ASPHALT CONFERENCE

This conference is to be held by the Asphalt Association at Louisville, Ky., October 13 to 15, with headquarters at the Brown Hotel. Among the speakers on the program are: E. W. James, chief of design, United States Bureau of Public Roads which organization is supervising the expenditure of some $200,000,000 annually for highways; Major C. P. Fortney, chairman of the West Virginia State Highway Commission which is building a $50,000,000 state highway system by bond issue, supplemented by Federal Aid funds and cash taxes; W. R. Neel, state highway engineer of Georgia where a movement looking to the construction of a paved state highway system is under way and where a large mileage of motor roads is already being constructed at low cost through the intelligent use of asphalt; Charles M. Upham, state highway engineer of North Carolina, the state that now leads all others in highway improvement and where a new type of asphalt paving known as "sand asphalt" has lately been perfected and applied to state highways; W. E. Grayson, of the Michigan State Highway Department which recently installed a large asphalt plant; C. A. Talley, of the New Orleans Refining Company; Herbert Spencer, of the Standard Oil Company of New Jersey; Prevost Hubbard, chemical engineer of the Asphalt Association, formerly chief of research, U. S. Bureau of Public Roads; J. E. Pennybacker, secretary and general manager of the Asphalt Association, formerly chief economist, U. S. Bureau of Public Roads, and others.

Methods of salvaging old gravel and macadam roads by using them as bases for asphalt surfaces, thus saving vast sums to the taxpaying public, will constitute one of the principal subjects to be discussed. Other subjects will be: "Sand Asphalt," "Black Base," "Shipment, Unloading and Storage of Asphalt," "Requirements for Portland Cement Concrete Foundations," "Research Work in Asphalt Paving," "Comparable Designs of Pavement," "Asphalt Maintenance," "How the Highway Industries Can Best Serve the Interests of the Public in Highway Improvement," "Progress of Highway Construction in Kentucky" and "Advantages of Bond Issues in the Construction of State Highway Systems."

NEWS OF THE SOCIETIES

CALENDAR

Oct. 22-25—AMERICAN SOCIETY OF CIVIL ENGINEERS. Fall meeting at Hotel Tuller, Detroit, Mich.

Oct. 29-31—PENNSYLVANIA WATER WORKS ASSOCIATION. Annual convention at Atlantic City, N. J.

Nov. 4-7—TEXAS ASSOCIATION OF SANITARIANS. Annual school in cooperation with State Board of Health, at Houston, Texas.

Nov. 6-8—IOWA SECTION, AMERICAN WATER WORKS ASSOCIATION. Tenth annual meeting at Iowa City, Ia.

Nov. 10-12—NATIONAL MUNICIPAL LEAGUE. Annual meeting at Harvard University, Cambridge, Mass.

Nov. 17-19—ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting at San Francisco.

Nov. 11-13—NORTH CAROLINA SECTION, AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Charlotte, N. C. Secretary, Thorndike Saville, University of North Carolina, Chapel Hill, N. C.

Jan. 5-6—INTERNATIONAL ASSOCIATION OF STREET SANITATION OFFICIALS. Annual conference at Hotel La Salle, Chicago, Ill.

Jan. 6-9, 1925—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention and road show at Chicago, Ill.

Jan. 21-23—AMERICAN SOCIETY OF CIVIL ENGINEERS. Anual meeting at New York, N. Y.

Feb. 24-27—AMERICAN CONCRETE INSTITUTE. Annual meeting at Chicago, Ill.

THE A. S. M. I. CONVENTION

The thirtieth annual convention of the American Society for Municipal Improvements was held in Boston, Mass., on Sept. 29 to Oct. 2, headquarters being at the Hotel Copley-Plaza. The number registered was about 325, of which about 175 were active members and about 75 were associate members and the remainder were guests. The business meetings were well attended, 75 to 100 being present at most of them, which is a good percentage of the total registration considering the counter attractions of a large city like Boston. The attendance included ten or more members from Texas, several from Florida, a number from Canada, with all sections between well represented.

The papers and reports were of great interest to all interested in municipal public works and utilities, as they invariably are; while the discussions were, perhaps, more than usually active and interesting.

An unfortunate feature of the convention was the location of the exhibit hall. This was in an out-of-the-way corner of the basement, the stairway to which was at the other end of the building from that at which the business meetings were held, and a very small percentage of those present found their way to the exhibits, greatly to the disappointment of the exhibitors who had gone to considerable trouble and expense to afford opportunities to the members to ascertain the latest developments in the way of road building, street cleaning, street signs and lights, and various other branches of municipal improvements. More fortunate was the location of an outside exhibit across the street from the hotel, where were shown various equipments for constructing, maintaining and cleaning city streets.

Invitations were received from a number of cities for the convention of 1924, the most urgent being from Dallas, Tex., Des Moines, Ia., Montreal, Canada, Rochester, N. Y., and Chicago, Ill. After careful consideration by the Executive Committee, with special consideration of the greatest advantages to the society, Des Moines was chosen for the 1925 convention. The date will be determined later.

The officers elected for the coming year are as follows: for president, E. L. Dalton of Dallas, Tex.; first vice-president, T. Chalkley Hatton of Milwaukee, Wis.; second vice-president, C. Arthur Poole of Rochester, N. Y.; third vice-president, John D. Hittell of Chicago, Ill. C. C. Brown was re-elected secretary, and the members of the Finance Committee also were re-elected, being W. A. Hansell, chairman; George F. Fisk and G. J. Requardt. For treasurer, P. L. Brockway of Wichita, Kans., was elected.

There were no changes in the constitution, nor was there any other important business transacted. The treasurer announced about $1,700 in the treasury. The secretary's figures concerning membership additions and losses showed a net gain of 13 members during the year.

Probably less time was devoted at this convention to the discussion of paving specifications than at any previous convention during the past ten years. A few minor changes were made in some of the specifications already adopted, the most extensive changes being those suggested for Portland cement concrete pavements.

Several of the committees on specifications held meetings on Monday afternoon, that of the Cement Concrete Pavement Committee continuing during a large part of the convention.

The formal opening of the convention was on Monday evening, the address of welcome being delivered by Frederick Fay, president of the Boston City Planning Commission, representing the Mayor. A brief response by E. L. Dalton was followed by the president's address, in which he stressed the desirability of giving to the associate members a more active part in the discussions of the society. This was followed by the reports of the Executive Committee, the Secretary, Treasurer and Finance Committee, and by the selection of committees on nominations and on resolutions, Messrs. Conant, Fisher, Kingsley, Fisk and Brockway being elected as the Committee on Nominations, and the Messrs. Corson, Folwell, Howard, Rankin and Shepard as the Committee on Resolutions.

The papers and technical discussions at the convention will be found elsewhere in this issue.

The exhibitors at the convention were: Public Works, New York City; American City, New York City; Engineering News-Record, New York City; W. & L. E. Gurley, Troy, N. Y.; Portland Cement Association, Chicago, Ill.; Acme Road Machine Co., Frankfort, N. Y.; Barber-Greene Company, Aurora, Ill.; Keystabond Asphalt Paving Co., Boston, Mass.; National Paving Brick Manufacturers Association, Cleveland, O.; Warren Brothers Company, Boston, Mass.; Asphalt Association, New York City; Philip Carey Co., Lockland, Cincinnati, O.; Barber Asphalt Co., Philadelphia, Pa.; Granite Paving Block Manufacurers Association, Boston, Mass.; Century Sign Co., Boston, Mass.; Municipal Street Sign Co., New York City; Elgin Sales Corporation, Chicago, Ill.; Automatic Signal & Sign Co., Chicago, Ill.; Chase & Lyman, Boston, Mass.; Standard Oil Co., New York City; Lock Joint Pipe Co., East Orange, N. J.; Cressy Road Sprayer, Manufacturing Co., Everett, Mass.; Kinney, Manufacturing Co., Boston, Mass.; Holophane Glass Co., New York City and Newark, O.

NEW ENGLAND WATERWORKS ASSOCIATION

The forty-third annual convention of this Association was held at Rochester, N. Y., Sept. 30th to Oct. 3rd, with headquarters at Powers Hotel. An exhibition of waterworks appliances was laid out in the ballroom on the first floor of the hotel. About 115 active members and half that number of associates members were registered. An all-day excursion to Niagara Falls on Thursday was provided by the Waterworks Manufacturers' Association.

The officers elected for the coming year were as follows: President, Stephen H. Taylor, superintendent of waterworks, New Bedford, Mass.; vice-president, Frank E. Winsor, engineer of Board of Water Supply, Providence, R. I.; treasurer, Alfred L. Sawyer, registrar of Haverhill, Mass.; directors, James A. McMurray, Division of Water, Boston, Mass., and Arthur D. Weston, Massachusetts Department of Health. The report of the Secretary, Frank J. Gifford, showed a total membership of 758, which is 11 less than a year ago. The Dexter Brackett Memorial Medal was awarded to Colonel George A. Johnson for his paper describing "The Rapid Sand Filters at Cambridge, Mass."

Tuesday morning, President David A Heffernan in his annual address, made an emphatic plea that the members take more interest in this Society and especially that the superintendents take a more active part in preparing papers and

discussing them. E. A. Fisher's paper describing "The Water Supply and Other Interesting Features of Rochester," was read by deputy city engineer John F. Skinner, Mr. Fisher being in attendance at the convention of the American Society for Municipal Improvements.

In the afternoon, after the presentation of the Dexter Brackett Memorial Medal, John F. Skinner described "The Reservoirs and Gravity Conduits of Rochester." Following this, Marshall B. Palmer, water engineer of Syracuse, described "The Syracuse Water Supply System." Stephen B. Storey, director of the Bureau of Municipal Research of Rochester, then read a paper entitled "Rochester's Meter Reading and Billing System." Discussing Mr. Storey's paper, William C. Hawley expressed the belief that every consumer should read his meter. He had saved both expense and trouble to his company by changing from quarterly billing to a monthly billing system, dividing the city into districts. Several commended the more or less common practice of sending out on postcards, on the backs of bills, etc., diagrams showing consumers how to read meters.

On Wednesday morning Charles B. Burdick read a paper entitled, "Infiltration Galleries at the Des Moines Waterworks," which was illustrated by lantern slides. This was followed by a paper by Francis F. Longley, of the Lock Joint Pipe Company, entitled, "Reinforced Concrete Pipe for Water Supply Lines Under Pressure." (Both papers will be presented in an early issue of PUBLIC WORKS.) Colonel Longley stated that such pipe had been tested under an internal pressure of 150 pounds running up to 300 pounds without any leakage.

In the afternoon Walter Wood described, "The Manufacture of 'Sand Spun Pipe,'" the paper being read by Charles Wood and discussed by J. M. Diven, C. M. Saville, William R. Conard, D. A. Heffernan and others. Charles A. Holmquist, director of the Division of Sanitation of the New York State Department of Health, then read a paper entitled, "The Relation of Improvements in Public Water Supplies to Typhoid Fever and Other Intestinal Diseases," which was discussed by Henry M. Symonds. A paper entitled, "Present Methods of Water Purification in Providence," by Julius W. Bugbee, was read by Frank Winsor, illustrated by lantern slides. This was followed by a paper by Martin F. Tiernan on "Chlorine in the Treatment of Respiratory Diseases," which was discussed by Charles W. Sherman and F. T. Kemble. W. M. Beisel, chief engineer of the Pottsville Water Company, then described "The Indian Creek Dam of the Pottsville Water Company."

In the evening V. Bernard Siems discussed "The Establishment of a Metropolitan District in Baltimore County Contiguous to Baltimore City." Following this, Caleb M. Saville gave much information concerning "Floods and Droughts on New England Streams," illustrated by lantern slides. This was followed by a brief history of the development of the Diesel engine and claims for its economy.

Thursday morning and afternoon were occupied with the excursion to Niagara Falls. In the evening, W. P. Mosteller, of the U. S. Cast Iron Pipe and Foundry Company, spoke on the subject of "Selling; Some Aspects of Selling from the Manufacturer's and Purchaser's Point of View." This was followed by a paper by C. C. Behney entitled, "The Luxuries of Yesterday Are the Necessities of Today."

On Friday morning William R. Conard read a paper entitled, "Large and Small Fire Hose, Water Pressure and Hydrant Spacings," which brought out considerable discussion. (An abstract of this paper will be published in PUBLIC WORKS). It was stated that in Concord, N. H., the chief of the fire department, the city engineer and the waterworks superintendent combined in deciding upon the location of fire hydrants, the fire chief's idea being given special consideration. In Milton, Mass., also the fire chief selects the location of fire hydrants. "The Automatic Control of Waterworks Valves" was the subject of a paper by Paine Dean.

Friday afternoon F. E. Beck's paper, "Increase of Available Water Supply with No Capital Expenditure," was read by Charles W. Sherman. The two final papers were on the subject of "Waterproofing a Leaking Standpipe," the work done at Lexington, Mass., being described by Charles S. Beaudry and that at Waltham, Mass., by George C. Brehm. These papers were discussed by Messrs. Sherman, Hastings and others.

AMERICAN ROADBUILDERS' ASSOCIATION

The Nominating Committee of the American Roadbuilders Association has submitted its official nominations for officers for 1925 and '26 and for directors for three years. Those nominated are as follows: For president, W. H. Connell, engineering executive and deputy secretary, State Highway Department, Harrisburg, Pa.; for vice-presidents: northeastern, W. R. Smith of Meriden, Conn.; southern, W. S. Keller of Montgomery, Ala.; central, S. F. Beatty of Chicago, Ill.; and western, Samuel Hill of Seattle, Wash. For treasurer, James H. MacDonald of New Haven, Conn.; for directors, northeastern, J. E. Pennybacker, New York City; W. H. Stone of Baltimore, Md. and T. J. Wasser of Newark, N. J.; southern, H. K. Bishop of Washington, D. C. and John E. Tate of Charlotte, N. C.; central, Paul L. Griffiths of Chicago, Ill.; western, H. S. Carpenter of Regina, Sask.

BOSTON SECTION A. S. M. E.

The Boston Section of the A.S.M.E. will co-operate with other organizations in a dinner in the Boston Chamber of Commerce building, on October 23rd, to be presided over by President Stratton of the Massachusetts Institute of Technology, in connection with "Management Week," the specific subject of this meeting being "Planning for Better Management on the Part of Medium and Small Sized Business."

During the coming year it is planned to hold meetings of the Boston Section regularly on the second Thursday of each month, commencing with November.

IOWA CONFERENCE ON SEWAGE TREATMENT

The sixth conference on Sewage Treatment will be held at the Iowa State College on October 28th to 30th. There will be lectures, demonstrations and round-table discussions of everyday problems encountered in the care and operation of sewage treatment plants. Everyone interested in the subject of sewage disposal is welcome. Those who attend should register as

(*Continued on page 41*)

PERSONALS

Witt, Raymond, has been appointed city engineer of Chico, Cal., in whose engineering department he has been employed for six years past.

Williams, H. S., recently city engineer of Santa Cruz, Cal., is now connected with the State Department of Public Works.

Godegast, Henry, formerly assistant city engineer of Santa Cruz, Cal., has been appointed city engineer of that city.

Earle, David M., city engineer of Worcester, Mass., died of heart disease on Sept. 29.

Bixby, J. M., has been appointed division engineer of Division I of the New York State Highway Department, with headquarters at Poughkeepsie.

Taylor, Sutherland G., export manager of the Holt Manufacturing Company, died on August 29.

White, Marshall K., formerly assistant city engineer of San Mateo, Cal., has been appointed acting city manager of that city.

Reimer, Frederick A., has opened an office for private business as an engineer and surveyor at 352 Main St., East Orange, N. J.

Blanchard, Prof. Arthur H., has been appointed consulting engineer to the Michigan State Highway Department.

Baker, Donald M., recently hydraulic engineer with the California State Department of Public Works, has opened an office for general practice in the Central Building, Los Angeles.

Dupuy, Ben F., recently city engineer of Glendale, Calif., has resigned that position.

Braden, Roy S., has been appointed city manager of Hopewell, Va.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

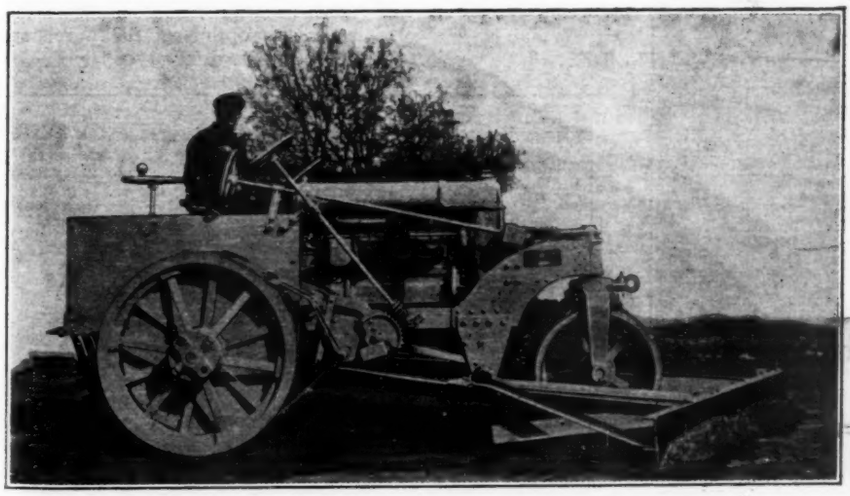
LEANING WHEEL GRADERS

The Austin-Western Road Machinery Co., of Chicago, Ill., has brought out a Leaning Wheel Grader which is claimed to be stronger and more powerful than any other make. One special advantage is that either or both of the rear wheels can, by means of a telescopic axle, be extended outward or brought together to adapt the grader to any conditions. The grader is made in three sizes, using 7-, 8- and 12-foot blades. One advantage of the shortened telescopic axle is the ability to pass other vehicles on a narrow road. Also any width or depth of ditch or shoulder can be graded conveniently by extending either wheel as desired, or both wheels. These adjustments of the rear axle can be made without stopping the machine, the controls being convenient to the operator on his platform.

The machines weigh from 2,650 pounds for the 7-foot blade to 8,250 pounds for the 12-foot blade, while the wheel bases vary from 11 foot for the smallest to 17 feet 5 inches for the largest.

ACME PONY ROLLER

The Acme Road Machinery Co., of Frankfort, N. Y., furnishes a five-ton, four-cylinder gasolene road roller which it calls the Acme Pony Roller and which utilizes as its power plant a Fordson unchanged. Roller and ball bearings are used throughout. All controls are within easy reach of the operator. A scarifier is attached near the rear rolls. A heavily reinforced scraper or planer is adjustable to any position in front and can be set at any angle for trimming shoulders, scraping to either right or left, etc. A special grooved front roll and cleats for the rear roll are furnished for rolling embankments.

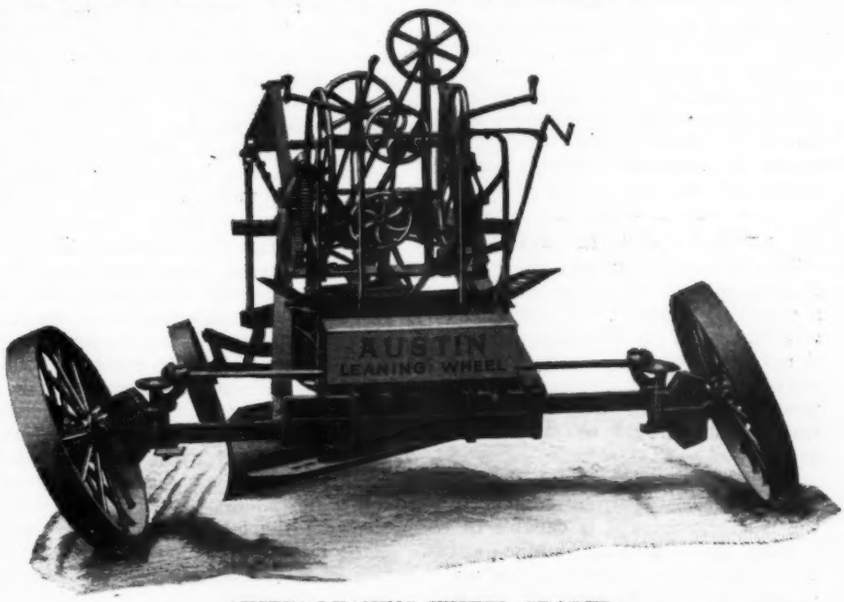


ACME PONY ROLLER WITH SCRAPER ATTACHED.

ASPHALT-CONCRETE PAVING BLOCKS

The Keystabond Asphalt Paving Co., Inc., of Boston, manufactures a monolithic asphalt concrete paving block which it calls "Keystablock." It consists of a concrete bottom and an asphalt top firmly bonded together. The wearing surface is made of a heavy plastic mixture, using a standard mesh composition of aggregate, which is compressed under hydraulic pressure. It is claimed that the wearing surface is much superior to that of the ordinary asphalt block, containing twice as much bitumen, the lateral strength being furnished by the concrete bottom. These blocks can be made in various depths and used for patching wood block, brick or sheet asphalt pavements. Some of them can be used for paving along car rails, and they can be made of any dimensions or shape to meet special conditions.

A "KEYSTABLOCK."



AUSTIN LEANING WHEEL GRADER.

THE LESSMANN LOADER.

The Lessmann Loader Manufacturing Company, of Des Moines, Ia., manufactures a loader for attachment to a Fordson tractor for which the makers guarantee that it has handled 480 yards of dirt in 9 hours building dikes, while the small size has loaded a yard of dirt from the ground to truck in 1 minute and 45 seconds. It is used for subgrading and general grading as well as handling dirt.

The power is taken off from the standard Ford gear pulley housing with a worm gear, then into a multiple disc clutch of the friction type and then to the hoist shaft, on which are wrapped two separate cables which raise and lower the shovel. The small size, No. 10, is equipped with a quarter-yard shovel, and No. 22 with a half-yard shovel. No. 44 is designed as a snow shovel and No. 66 as a coal shovel.

HOIST FOR LOW HEAD ROOM

The American Engineering Company, of Philadelphia, manufactures electric monorail hoists which it claims operate in less head room than any other hoist on the market, to which they give the name "Lo-hed." The design is such that the load block can be drawn up inside the frame of the machine until it almost touches the rail and the minimum head room required from rail to hook is only 9 inches in the ½-ton hoist and only 25 inches in the 6-ton.

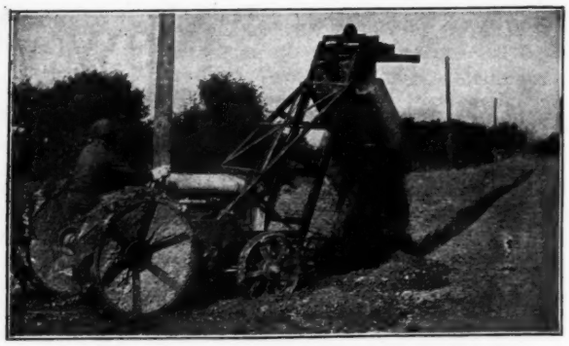
Advantages claimed for this "Lo-hed" are that the hoist can be used where ceilings are low, it gives ample clearance over congested floors, and piles materials higher than could be done by other means.

In these hoists roller bearings and automatic lubrication reduce friction to a minimum. Automatic lowering and holding brakes and a check at the upper limit of travel safeguard the operation. A safety factor of at least five is used in construction. The hoists are furnished for either direct or alternating current, and with plain, handgeared, or motor-driven trolley. They travel on standard I-beams, around curves and through switches.

ANTHONY SHOVEL CRANE

The Anthony Company of Streator, Ill., has recently placed on the market a one-lever shovel crane designed for attachment to the Fordson tractor. It is not intended as a competitor for a heavy steam shovel, but is offered as a power loader or digger on work smaller than would warrant a heavy shovel.

The steel framework of the crane is supported at only three points on the tractor, where it is capable of receiving them without undue stress. This framework consists of five major welded sections, all parts being built on jigs to insure interchangeability. The clutch, brake mechanism and reduction gears necessary for operating the winch are all enclosed within a cast-iron, oil-tight case, and operate in oil. This case is attached to the standard power takeoff gear of the Fordson. Except the spur gears and several small parts, the entire mechanism is made up of parts replaceable from the shelves of any Ford dealer.



ANTHONY ONE-LEVER SHOVEL CRANE.

The shovel dolly consists of a rigid structure upon which are mounted four cast steel flanged wheels that roll within the channel track of the boom portion of the structure. This dolly is lifted and lowered by means of a ⅜-inch cable fastened by a yoke and to a swivel joint on the bottom axle of the dolly, the cable passing up to a sheave at the top of the boom and down to the winch. The shovel is rigidly fastened to the dolly. It is raised until the bottom is 79 inches from the ground, clearing the side of practically any truck.

For loading, the shovel is lowered until the cutting edge rests upon the ground, (there is sufficient travel to permit it to be dropped 4 inches below this position). It is then loaded by moving the tractor forward and the bucket is then raised. The shovel has ¼ cubic yard capacity, but can handle 1/3 cubic yard when digging in soft dirt. The shovel when filled is raised to the top of the boom, where it assumes an angle of 60 degrees, discharging the load. There is an automatic throw-out which arrests the motion of the shovel when it reaches the top of the track.

INDUSTRIAL CRAWLING TRACTOR CRANE

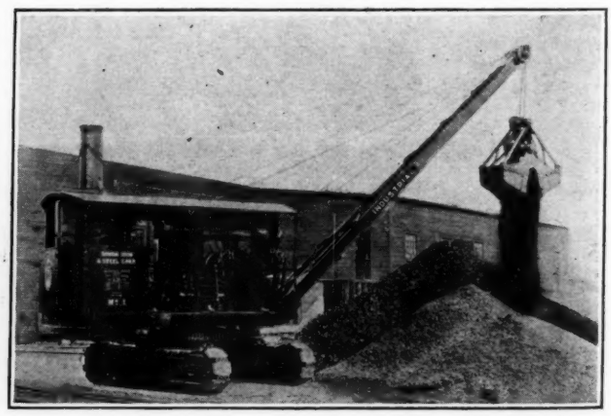
The Industrial Works, of Bay City, Mich., is offering a ten-ton crawling tractor crane, one of the most important features of which is the independent control of the traveling, slewing and hoisting motions, permitting a variety of combinations that afford increased speed and efficiency of operation. Slewing can be done in either direction without reversing the engine. A slewing brake holds the boom securely with a suspended load in any position, preventing sudden rotation. The entire upper works rests on a steel base that rotates on four conical steel rollers.

The crane has two traveling speeds. Steering while propelling is accomplished from the operator's platform, and he can propel and steer independently of all other motions with the boom in any position. Another feature claimed to be exclusive is the automatic double hoisting drums which provide automatic control of the bucket during operation, efficient for dragline and hoisting purposes.

This crane is built for either steam, electric or gasoline power. The steam crane has two horizontal, double acting 6-in. cylinders with 8-in. stroke. The gasoline crane is equipped with either Buda, Climax, Wellman-Seaver-Morgan, or automatic semi-Diesel engines, at the option of the purchaser.

(*Continued from page 42*)

"LO-HED" HOIST HANDLING STEEL BEAMS.



"INDUSTRIAL" TEN-TON CRAWLING TRACTOR CRANE.

NEW CATALOGS

(If you want any of these catalogs send the number with your name and address to PUBLIC WORKS and it will be sent to you promptly without charge or obligation.)

HEAVY DUTY MIXER

777. The Koehring Company of Milwaukee, Wis. Specifications and numerous diagrams and illustrations of the Koehring Heavy Duty Construction Mixer, No. 21S. 20 pages. 8x11.

GROUP INSURANCE

778. The Travelers Insurance Company of Hartford, Conn. Describes the system of Group Life Insurance and the advantages claimed. 26 pages. 8½x11.

CEMENT TOOLS

779. The Abram Cement Tool Company, Detroit, Mich. Catalog of all kinds of concrete finishing tools, concrete mixers, block making machines, etc., 32 pages. 6x9.

CONSTRUCTION EQUIPMENT

780. The Associated General Contractors of America, Washington, D. C. Report on current practices of accounting for construction equipment expenses.

"HOW TO CURE CONCRETE"

781. The Dow Chemical Company, Midland, Mich. Gives complete instructions for use of Dowflake for curing concrete. Profusely illustrated. 48 pages. 5½x7½.

DIESEL ENGINES

782. Busch-Sulzer Bros. Diesel Engine Co., St. Louis, Mo. Explains the Diesel principle, giving details of operation, cost, construction, uses and advantages. Elaborately gotten up and illustrated. 96 pages. 8½x11.

PORTABLE AIR POWER

783. Ingersoll-Rand Company, New York City. "One Hundred and One Ways to Save Money with Portable Air Power." Detailed information concerning actual uses made of compressed air tools in public and other work. 72 pages. 8½x11.

AUTOMATIC STATION CONTROL

784. The General Electric Co., Schenectady, N. Y. Lists and photographs of plants using Automatic Station Control Equipment. 28 pages. 8x10½.

OXY-ACETYLENE WELDING

785. Torchweld Equipment Co., of Chicago, Ill. Describes appliances for welding, cutting and soldering, together with acetylene generators and accessories. 48 pages. 8½x11.

SEWAGE SCREENS AND GATES

786. Sanitation Corporation, New York City. Describes improvements in the R. W. Screen, and other types of screens, sewage gates, etc. 4 pages. 8x10½.

TRAFFIC LINE MARKER

787. Highway Appliance Co., Providence, R. I. Describes the A. B. C. traffic line marker. 6 pages. 6x9.

NEWS OF THE SOCIETIES

(Continued from page 38)

promptly as possible after 10 A. M., Oct. 28th, at Room 105, Engineering Hall. There will be morning, afternoon and evening sessions in the Assembly Room on the second floor of Engineering Hall.

SOUTHWEST WATERWORKS ASSOCIATION

This Society met at Topeka, Kan., October 6 to 9. In connection with the convention there was an exhibition of waterworks appliances in the Audience Room.

The officers elected for the ensuing year were: President, W. H. Anderson, of Tulsa; vice-president, Wilber Stanfield, of Topeka, Kan.; secretary-treasurer, R. D. Morgan, of Mexia, Tex. The secretary reported $375 in the treasury with all bills paid. The Executive Committee reported that it had taken over the Texas State Waterworks Association with its filter operator school as a section of the Society, and it was proposed to establish such schools in each of the other seven states included in the southwestern territory.

A paper entitled "Co-operation and Importance of the Board of Health to Water Departments" was read by Ernest Boyce, state sanitary engineer of Kansas. He considered a minimum of control with a maximum of co-operation to be the proper aim of a state health board, including the prevention of injury through the consumers of public water supplies. V. M. Ehlers, state sanitary engineer of Texas, described the Texas Operators' School. Six schools of two weeks' duration have been held at cities where filters are operated so that practical demonstrations could be made. The Society endorsed the proposal of a state law requiring operators to attend such a school annually.

A. S. Holway described the water supply of Tulsa, Okla., with its 60-mile pipe line, the last section of which was just being put under construction.

N. T. Veatch, of the firm of Black & Veatch, which designed and supervised the new softening and filter plant at Topeka, gave a general description of this plant, while A. L. Goggins, chemist in charge of operation, demonstrated at the plant the method of bacterial control. Col. T. A. Leisen, the recently appointed general manager of the Omaha Metropolitan Utilities District, described the Detroit filters. R. E. McDonnell read a paper entitled "Modern Reservoir Construction," showing by moving pictures the construction of a circular concrete reservoir at Cedar Rapids. Lewis I. Birdsall, consulting engineer of the General Chemical Company, described the treatment of water by coagulation, sedimentation and filtration; while Frank Bachman, of the Dorr Company, explained the use of the mechanical clarifier where the water is very turbid. James W. Ivy, of the American Castiron Pipe Company, spoke of the increase in length of pipe from 12 to 16 feet, the use of longer bells for gas pipe, the making of sizes smaller than 3-inch for service pipe, the centrifugal method of casting pipe, and bronze welding, which he said cost less than the ordinary bell and spigot lead joint.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, etc., required by the Act of Congress of August 24, 1912, of Public Works, published monthly at New York, N. Y., for October 1, 1924.

State of New York, County of New York, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared James T. Morris, who, having been duly sworn according to law, deposes and says that he is the business manager of Public Works, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and, if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business editor and business managers are:

Publisher—Public Works Journal Corporation, 243 West 39th Street, New York, N. Y.
Editor—A. Prescott Folwell, Montclair, N. J.
Managing Editor—A. Prescott Folwell, Montclair, N. J.
Business Manager—James T. Morris, White Plains, N. Y.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock.)

Public Works Journal Corporation, 243 West 39th Street, New York, N. Y.
Sumner W. Hume, 243 West 39th Street, New York, N. Y.
James T. Morris, White Plains, N. Y.
A. Prescott Folwell, Montclair, N. J
Contracting Pub. Co., New York, N. Y.
Stockholders of Contracting Publishing Co.:
H. F. Pomeroy, 33 W. 42nd St., New York, N. Y.
J. R. Breuchaud, 342 Madison Ave., N. Y. City.
Frank W. Skinner, 20 Vesey Street, N. Y. City.
H. F. Hackerdorn, Consumers Bldg., Chicago, Ill.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are:

Swetland Publishing Company, 239 West 39th Street, New York, N. Y.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest, direct or indirect, in the said stock, bonds or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (This information is required from daily publications only.)

JAMES T. MORRIS, Business Manager.

Sworn to and subscribed before me this 26th day of September, 1924.

(Seal) H. H. MINER,
Notary Public, No. 224, New York County.
Register's No. 6001.
(Commission Expires March 30, 1926.)

(*Continued from page 40*)

The crane will operate with clamshell or dragline bucket, electro-magnet, hook and block, or grapple, and is readily convertible into a shovel or pile driver. The makers offer it as a general utility crane of small capacity adapted to all fields of industry.

TRAIL-FORD TRUCKS

This is a six-wheel truck, made up of a Fordson and a detachable body on two wheels. The attachment is equipped with 20-inch brakes and is operated from the driver's seat. It is built exclusively for use with a Fordson, it being necessary only to change the front axle to a spring axle, and mount 32-inch dished steel wheels on the rear axle, with 42x9-inch tires. The tractor has a standard 56-inch tread.

The Fordson is fitted with a steel cab. The truck is fitted with a 7-yard side-dump body, substantially built of steel. All of the special equipment is manufactured by the Trail-Ford Corporation, of Ann Arbor, Mich. Several have recently been sold to the city of Detroit.

THE "TRUK-TRAK"

The Sivyer Steel Casting Co., of Milwaukee, makes an endless steel belt to be applied to the circumference of the rear wheels of any truck with a capacity of two tons or over to increase its pulling power in bad roads, snow, etc. The endless belt runs over an idler in front of the wheel which is raised above the ground level, which position aids in climbing out of holes or over obstructions. Another idler in contact with the wheel insures proper tension in the track. When not in use, the track is carried on a reel fastened to rear of the truck body.

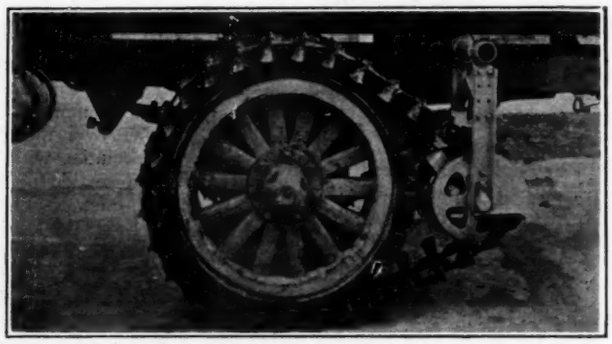
A few bolts are used to fasten the reel to the body, and the idler supporting shaft is fastened to the frame with clamps. Three models are made: For 2- to 2½-ton trucks using 7- or 8-inch single solid or pneumatic tires on the rear wheels. For 3- to 5-ton trucks using 10- or 12-inch single solids or 5-inch dual solids. And for 5-ton trucks using 12- or 14-inch single solids or 6-inch dual solids.

The makers believe this will prove especially advantageous for use with trucks equipped with snow plows for cleaning streets and roads. It demonstrated its superiority to chains in some heavy snows last winter.

"DEPENDABLE" TRUCK HOIST

The Dependable Mfg. Co., of Streator, Ill., manufactures a hoist for Ford trucks which has a lifting capacity of more than can be hauled by a Ford truck and can be attached without drilling holes or using special tools. It is easily operated by hand, either a pump handle motion or a crank being used, usually the pump handle to start the load and the crank to finish hoisting. Not more than one inch of space between the body and the cab is required for the hoist. The hoist itself and the hinges either bolt into the chassis frame in holes already there or are clamped in place without special drilling. The shipping weight complete is about 100 pounds.

The company also furnishes a heavy duty hand hoist for trucks of other makes.

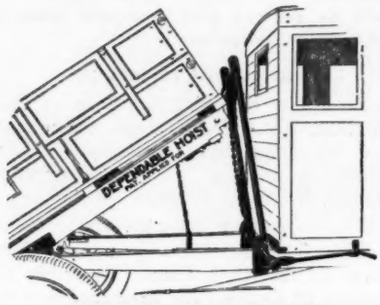


A TRUK-TRAK IN POSITION.

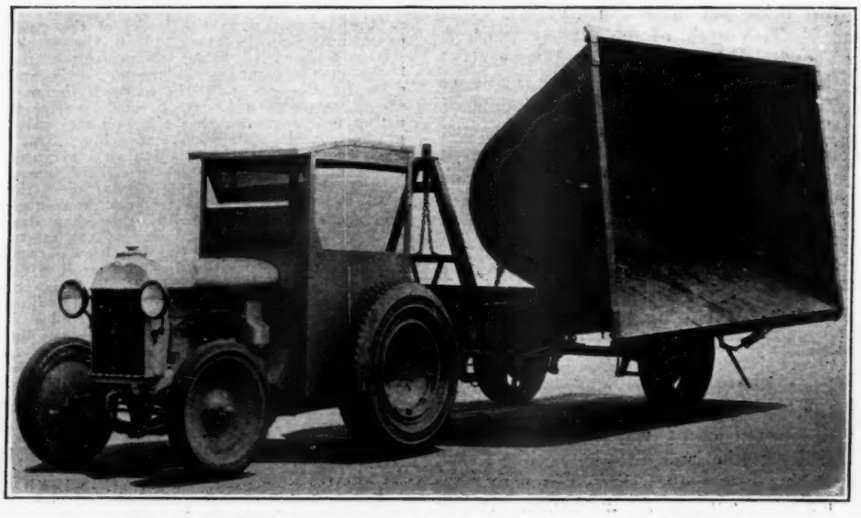
"GENERAL UTILITY" BODY.

GENERAL UTILITY BODY

The Convertible Wagon Trailer Company, of Buffalo, N. Y., offers a four-in-one general utility body, combining in one unit a naked platform, regular stake, panel side, and combination stake, at the moderate price of $150. It releases its load if desired by means of an easily handled gravity dump.



"DEPENDABLE" HOIST.

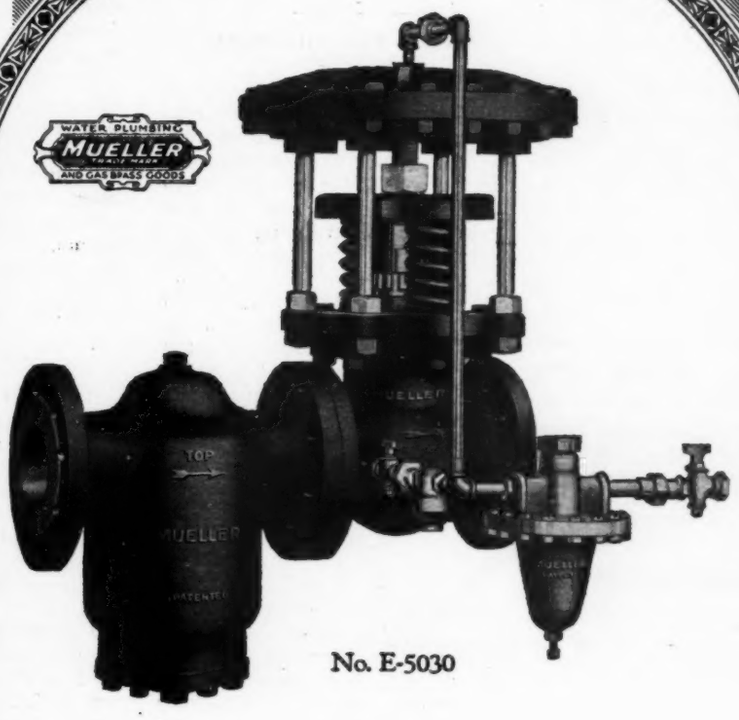


ONE OF TEN TRAIL-FORDS SOLD TO CITY OF DETROIT.

GIANT PIPE PUSHER.

The Giant Manufacturing Company of Council Bluffs, Ia., manufactures a pipe pusher in three sizes to be used in pushing service pipe and other pipe through the ground or withdrawing it from the ground without digging any trenches. This they state is especially useful where it is necessary to run small pipes underneath a railroad right-of-way, under a paved street or a lawn, under frozen ground in winter, etc. They claim that it will

(*Continued on page 44*)



No. E-5030

MUELLER

Reducing and Regulating Valves

are designed for use on services where exacting regulation is required. Mueller standards of precision in manufacture — based upon careful laboratory control—insure dependable regulators.

No. E-5030 was designed to meet the demand for a regulator to supply a large volume on large supply lines to buildings or water mains. This valve is absolutely dependable for close regulation on water, air or oil.

The Mueller experts will gladly help you solve your regulating problems upon request, and without obligation.

Mueller Co., Decatur, Ill., U. S. A.

145-149 W. 30th St., New York; 1072-76 Howard St., San Francisco; 2468 Hunter St., Los Angeles

(Continued from page 42)

operate in any soil that a spade will dig, and even in rocky soil can be used for withdrawing an old damaged pipe and replacing it with a new one. It is operated by hand, using powerful double leverage.

MERRILL ASPHALT KETTLE

A heater for bituminous materials is manufactured by Chase & Lyman, of Boston, who claim that it eliminates carbonizing of the bituminous material and burning out of the kettle bottom.

The heat is furnished by an oil burner, the flame of which enters a large horizontal pipe set inside the kettle near the bottom, returns through seven or more smaller pipes or tubes a few inches higher in the kettle, and from these the waste gases pass up through a vertical flue at the end of the kettle. In entering, the gases draw air into the tube which is claimed to form a sheath around the flame, modifying the heat and preventing carbonizing of the asphalt. Several valves in the bottom of the kettle admit compressed air in small quantities, just sufficient to slowly agitate the bitumen and keep it heated uniformly.

METHOD OF OPERATION OF MERRILL KETTLE.

A non-clogging draw-off valve near the rear end of the flame tube permits drawing off the bitumen from the point where it first melts, thirty or forty minutes after the flame is lighted. Kettles of 500 gallons and 200 gallons capacity are furnished. For the former is claimed a capacity of 2,110 gallons in a 10-hour day.

BAKER BACKFILLER

The Baker Manufacturing Company of Springfield, Ill. manufactures a backfiller blade for attachment to Fordson tractors which can be used for refilling trenches, levelling off dumps and similar work. The blade reaches far enough in front to keep the tractor wheels always on firm ground. The mould board is 6 feet long and 19 inches high, to which is attached a cutting blade 6 inches wide made of high carbon steel, removable and reversible. There is a lifting device with self-locking worm and worm gear operated by a hand wheel. The frame is hitched at the rear to the end of the drawbar casting of the tractor and is suspended in front from the front cover casting. The total weight is about 850 pounds. The blade can be removed quickly if it is desired to use the tractor for other work.

"CON-TEX" FOR CONCRETE SURFACES

The Concrete Surface Corporation of New York City advertises a material which it calls "Con-Tex" for improving the appearance of concrete surface by removing the cement from around the stones on the surface, as is sometimes done by scrubbing concrete before it has taken the final set. The makers say that it is not acid and does not injure hands or forms, and will not wash off by rain. It comes in liquid form to be used in painting the forms, or in the form of a coating on special paper, which is laid on exposed upper surfaces, such as floors, roadways, etc., after screeding. In either case, after the concrete has set the forms or paper is removed and a stiff brush then removes the outer material like damp sand, leaving the aggregates exposed.

STARTING COMPENSATOR FOR INDUCTION MOTORS

The General Electric Company, of Schenectady, N. Y., is about to place on the market a new automatic starting compensator for squirrel cage induction motors, for remote control of constant speed, 2-phase or 3-phase motors up to 600 volts for pumps and other equipment. The equipment may be started or stopped from a distance by means of small hand-operated push buttons or snap switches, float switch, etc. Definite and adjustable time acceleration is obtained by means of a new induction type relay.

IMPROVED R. W. SCREEN

The Sanitation Corporation, of New York City, offers what it considers a most important improvement to its R. W. screen—a curved slot plate, which permits finer slots, more perfect cleaning, greatly increased capacity and higher removal of solids. Existing R. W. screens can be equipped with these plates, which can be furnished in monel metal, phosphor or manganese bronze, or other metal.

The company also manufactures bar screens, trash screens, drum screens, band screens and sanitation disc screens. A trash screen used in New York City was described in the July issue of Public Works.

INDUSTRIAL NOTES

WOOD TRASH AND SEWAGE PUMP

This pump, the patent for which was upheld a few months ago (see Public Works for April, 1924), will be marketed by the Pacific Flush Tank Co., of Chicago and New York.

This pump has been used for some years in New Orleans, for which city A. B. Wood designed it. It has a specially rounded or blunt edge to the runner blades, so that trash, rags or paper will not lodge on them, but will be carried on through. It will pass large solids, and therefore screening the liquid before pumping is not necessary. It is strongly constructed throughout.

CHAUSSE OIL BURNER CO.

The Chausse Oil Burner Company announces a change in its address to Elkhart, Ind., where it has completed a new factory on West Beardsley Avenue, in conjunction with the White Manufacturing Company, with which it is associated. The factory which these companies have been occupying in Goshen was seriously damaged by fire some time ago. The new plant, which is constructed entirely of brick, steel and cement, has double the facilities of the old one for the production of Chausse kerosene torches, tool and surface heaters, and the White Manufacturing Company's line of railway car parts.

HEIL MECHANICAL HOIST

The Heil Co., Milwaukee, Wis., has acquired the patents and patterns of the Titan Mechanical Hoist for motor trucks and shortly will be able to furnish this hoist for mounting on any make or model of truck.

The hoist will be known as the "Heil Mechanical Hoist." The Heil Co. now manufactures hand hoists, gravity bodies and "Hydro" hoists in five sizes, for all trucks.

The Heil Co. has been observing very carefully the operation of the Titan Hoist since it was put into service in 1920. During the past four years it has been thoroughly tested and developed. Its special features are its high dumping angle, lightness of weight and design of mechanism. The hoist weighs approximately 400 pounds.

IOWA DISTRIBUTORS OF CATERPILLARS

The Holt Manufacturing Company, of Peoria, Ill., has appointed the Dukehart Machinery Co., 106-110 West Second Street, Des Moines, Ia., as distributors of its caterpillar tractors in Iowa (except counties adjacent to Nebraska). A. G. Forney, formerly sales representative of the Holt Co. in central Iowa, will be associated with Dukehart Machinery Co.

NEWS OF THE SOCIETIES

CALENDAR

Dec. 2 — NATIONAL HIGHWAY TRAFFIC ASSOCIATION. Annual meeting in New York City, at clubhouse of Automobile Club of America.

Dec. 4-5—HIGHWAY RESEARCH BOARD, DIVISION OF ENGINEERING, National Research Council. Fourth annual meeting, Washington, D. C.

Dec. 5-6—CENTRAL STATES SECTION, AMERICAN WATER WORKS ASSOCIATION. Annual meeting at Wheeling, W. Va.

Dec. 15-16—NATIONAL CONFERENCE ON STREET AND HIGHWAY SAFETY, AT WASHINGTON, D. C.; called by Secretary Hover.

Jan. 5-6—INTERNATIONAL ASSOCIATION OF STREET SANITATION OFFICIALS. Annual conference at Hotel La Salle, Chicago, Ill.

Jan. 6-9, 1925—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention and road show at Chicago, Ill.

Jan. 12-14—ASSOCIATED GENERAL CONTRACTORS OF AMERICA. Sixth annual meeting at Washington, D. C.

Jan. 21-23—AMERICAN SOCIETY OF CIVIL ENGINEERS. Anual meeting at New York, N. Y.

Feb. 24-27—AMERICAN CONCRETE INSTITUTE. Annual meeting at Chicago, Ill.

AMERICAN PUBLIC HEALTH ASSOCIATION.

The annual convention of this Association was held in Detroit October 20th to 23d. The meetings of the Sanitary Section, as usual, were those of chief interest to engineers. This section chose for its officers for the coming year Langdon Pearse as chairman, Abel Wolman as vice-chairman and George W. Simons, Jr., as secretary.

Advance in water supply and water purification was reviewed by George W. Fuller. Joel I. Connelly of the U. S. Public Health Service, and A. E. Gorman, sanitary engineer in charge of chlorination of the Chicago water supply, described the precautions being taken for securing safer potable water supplies for the vessels sailing the Great Lakes; H. W. Ferguson stating in the discussion that the Canadian health officials are co-operating in securing this result. John M. Helper, assistant sanitary engineer of the Michigan State Board of Health, read a paper entitled "Resort Sanitation," in which he stated that a number of states, including Ohio, Pennsylvania and Illinois as well as Michigan, were inspecting wells along the highways and warning tourists against those that were unsafe. Jack J. Hinman, in a paper entitled "Differentiation in Water Purification," discussed very completely the means available for identifying B-coli.

Dr. F. W. Mohlman, chemist of the Sanitary District of Chicago, read a paper evaluating the various methods and tests employed in analyzing sewage, including the biochemical oxygen demand test. He stated that the oxygen demand for the sanitary district has been determined as 0.22 pounds per capita daily, and from this and the dissolved oxygen the oxygen balance is determined. Langdon Pearse presented the report of the Committee on Sludge Utilization, stating that considerable progress is anticipated following the beginning of operation next year of the Milwaukee activated sludge plant. The Committee on Definitions of Sewerage Terms, John F. Skinner chairman, presented a progress report, expecting to present a final one next year.

The Committee on Garbage and Refuse Disposal had sent out a questionnaire dealing with the framing of general specifications and contract guarantee and test requirements for incinerators. The general opinion appeared to be that it did not seem practicable at this time to prepare anything like detailed specifications, but that it might be feasible to agree upon general principles, and the committee was asked to continue its investigations.

In a paper entitled "Value in the Control of Environment," Mr. Wolman made a plea for more extensive education in public health, stating that in the ten schools giving degrees in sanitary engineering, public health training occupies but 0.4% of the course, while only 10% is occupied by all the sanitary engineering subjects, such as water supply, sewerage, etc.

ASSOCIATED GENERAL CONTRACTORS

At the meeting of the Executive Board of the Associated General Contractors of America on October 13th to 15th, it was decided that the next annual meeting will be held in Washington, D. C., January 12th to 15th; also that at this time the Society shall consider a recommendation to change the name of the organization to the Associated General Constructors of America. General R. C. Marshall believes that the term "constructor" is more truly descriptive of the functions of the members of the Society than the word "contractor."

It was hoped that the Society might develop affiliation with equipment manufacturers similar to that already perfected with the manufacturers of concrete mixers, which affiliated group has been given the designation "Mixer Manufacturers Bureau." The subject of a code of ethics for general contractors was discussed at considerable length and a number of changes in the draft previously made were decided upon. It is expected that the code as modified will be considered by the Convention in January.

A questionnaire sent to the members and replied to by more than five hundred of them showed nearly $2,000,000,000 of work performed in 1923, of which 70% was buildings, 8% highways, 14% other public works and 8% railways.

Nominations completing the list of names for the official ballot were determined upon. George B. Walbridge of Detroit was nominated to succeed Frederick L. Cranford as president, and Harry W. Baum of Salt Lake City was nominated as vice-president at large; W. F. Creighton and Sumner Sollitt for vice-presidents zone 3; C. S. Downey and Godfrey Edwards for vice-presidents zone 5; Lea Hunt and E. R. Shenk for director district 4; H. R. Blagg, J. Lee Davis and C. W. Lundorff for director district 5; E. C. Derby, F. N. Garthwait and J. W. Stout for director district 6; J. S. Crinkley and J. Keller for director district 9; and Leonard Stark and H. S. Tullock for director district 11.

In connection with the meeting of the Executive Board, there was a meeting of the Chapter Secretaries which was attended by a larger number of secretaries than any previous meeting. Colonel D. H. Sawyer presided.

NATIONAL HIGHWAY TRAFFIC ASSOCIATION.

The annual meeting of this association will be held in the new clubhouse of the Automobile Club of America, 12 East 53d Street, New York City, on December 2d. The afternoon session will begin at 2.30; there will be a dinner at 6 in the grill room, and the second session will begin at 8 P. M. The subjects to be discussed are named by President A. H. Blanchard as follows: "Solutions of the parking problem in congested districts of municipalitjes;" "Enforcement of traffic regulations by utilization of a police traffic bureau;" "Methods of increasing traffic capacity of streets;" "State fees for commercial motor vehicles operating as private and common carriers;" "Advantages and disadvantages of compulsory automobile liability insurance;" "Methods of forecasting future traffic and the saturation point in the utilization of motor vehicles;" "Regulation of pedestrian traffic;" and reports of national committee on weights, dimensions and speeds of tractors, trailers and semi-trailers.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The annual meeting of this Society will be held in New York on December 1st to 4th, and the program will be divided into three or four sections at each session. Among the papers that will be of interest to many engineers and others connected with public works may be mentioned the following: On Thursday morning, December 4th, under the head of steam power, "The Increase in Steam

(Continued on page 41)

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

ALDRICH ROAD PUMPS.

The Aldrich Pump Company of Allentown, Pa., manufactures a road pump especially for contractors which it calls the "Utility High Pressure Road Pump." This is built in different sizes with capacities of 60 gallons per minute against 500 pounds pressure, 40 gallons under 400 pounds pressure and 40 gallons under 200 pounds pressure. In each case a vertical triplex pump is used, connected to a 4-cylinder Hercules heavy-duty power unit for the largest pump, to a 4-cylinder LeRoi engine for the second, and to a 2-cylinder LeRoi for the smallest size. The triplex pump gives a uniform flow of water. The pumps are single-acting, outside packed. A galvanized steel canopy with four doors encloses both engine and pump, there being a separate housing for the engine in the largest size.

ALDRICH ROAD PUMP.

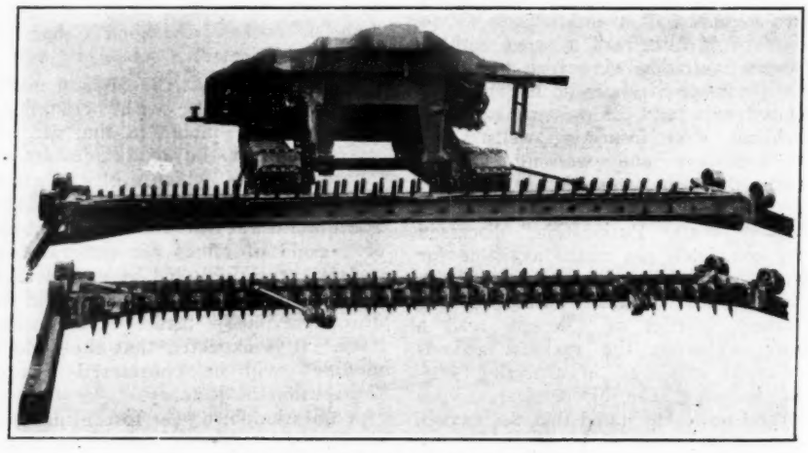
Among the important features to which attention is called by the manufacturer is the single reduction of gearing, the vertical triplex pump with its great accessibility, the removable die-cast shell bearings, the laminated shims, the totally enclosed gear guard, and the use of extra heavy steel channels for supporting the pump and engine.

The largest pump is able to pump 60 gallons per minute through 14,000 feet of 2-inch pipe against no head, or 16,680 feet if 2½-inch pipe be used for the first mile; the length of pipe, of course, being less as the head pumped against increases, being limited to 3,030 feet and 6,600 feet, respectively, where the head is 900 feet.

KOEHRING SUBGRADE PLANER

The Koehring Company, of Milwaukee, has recently placed on the market a device which is designed to finish off the subgrade just before placing the concrete. It consists of a scarifier and blade scraper spaced about 12 inches apart. The planer is supported on the road forms by two small wheels on each end and is automatically moved along by the paver. The scarifier teeth are set a little below the scraper blades causing the high spots to be cut off and leaving the surface in a condition that can be scraped off to a true smooth surface by the scraper. The loose dirt being retained by the scraper blades fills in the low spots leaving a surface conforming to accurate grade. In light soil the planer will grade efficiently to a depth of 2 inches, but it is not designed to work in hard clay or in an old macadam road bed or one which has shale or rock embedded in large quantities. Draw bars with special hub caps are provided for attaching the planer to the paver; the machine may be placed either in the rear under the discharge chute, or in front directly back of the charging skip, but it performs to best advantage in the former position. In operation. the ground men or spreaders mount the planer to give added weight and with ordinary ground conditions the grate is accurately established while the mixer moves ahead. Where soil is hard the operation can be quickly repeated by backing up the mixer and going over it the second time if necessary. Sufficient loose soil or sand should be kept between the rooter teeth and blades to fill in the low spots.

The machine is adjustable to all present types of crowns and is built for roads of either 16, 18 or 20 foot widths. Weight complete with draw bars of an 18 foot machine is 1410 pounds.

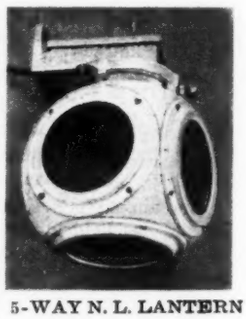


KOEHRING SUBGRADE PLANER.

N-L SIGNAL LANTERNS

The Nichols Lintern Company, of Cleveland, Ohio, manufactures light weight signal lanterns for use at street intersections, curves, etc., for traffic signals and other purposes. Among these is a one-way lamp made of cast aluminum and weighing only four pounds. The lamp is said to be dust, moisture and weather proof. The lens is a four-inch Corning in ruby, green, yellow or clear.

There is also a five-way lamp, having four apertures in the vertical sides and one in the bottom. Any combination of colored lenses can be used or a metal blank may be used in any side through which light is not wanted. This lamp also is of cast aluminum and weighs six pounds, and uses the same size and colors of lenses used in the one-way.



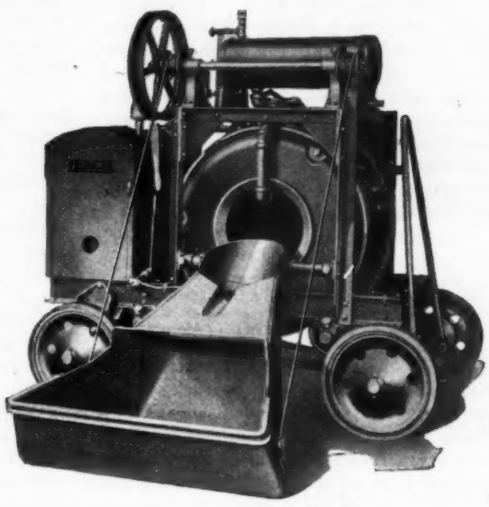
5-WAY N. L. LANTERN

"Young Sol" is used where it is necessary to illuminate the ground as well as send warning rays for some distance. Corning Fresnel 4¾-inch lenses are used for the horizontal warning rays and a sixteen-inch polished aluminum reflector lights the ground beneath. This lantern is furnished with a span wire hanger, eye bolts or ¾-inch pipe suspension. It is made of aluminum and weighs ten pounds.

THE LEACH 7-S MIXER.

The Leach Company, Oshkosh, Wis., formerly the Oshkosh Manufacturing Company, manufactures a concrete mixer for which it claims especially rapid loading and discharging, complete discharge of all concrete from the drum and mixing plates, and uniform rapid speed of revolution of the drum.

The truck is of 3-point suspension with a wheel base of 68 inches, very heavy axles and rugged wheels of large diameter. A jack or stabilizer is used when the mixer is in operation and thrown out when it is moved. The drum is ruggedly built with cast semi-steel heads and shell of No. 10 gauge plate and revolves at 20 r.p.m. The chute is 36 inches long and 15½ inches wide and when discharging is locked at an angle of 37 degrees below the horizontal. The charging hopper is low and wide and has a slope of 40 degrees. A power side loader is provided as optional equipment; it is elevated in 7 seconds to a slope of 54 degrees. The water tank has a capacity of 18 gallons and is of the sight measuring type. The mixer is driven by a 2-cylinder 8-horse-power engine of the automobile type of construction. Or the mixer can be equipped with 5-horse-power electric motor of any standard make.

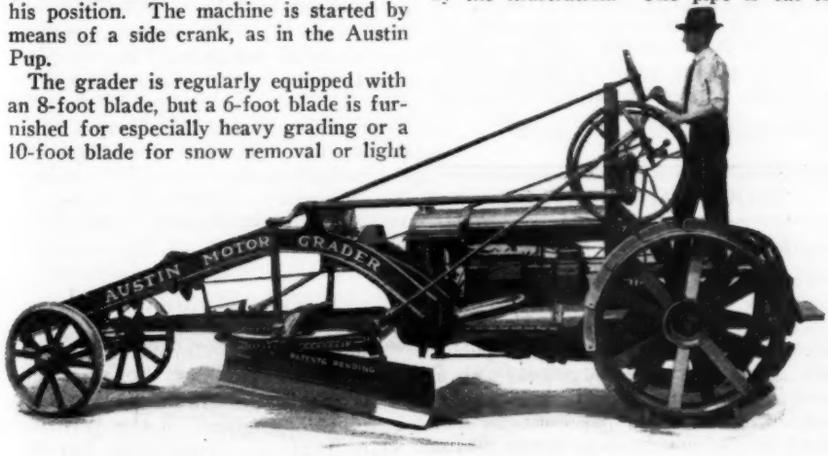


THE 7-S MIXER.

AUSTIN MOTOR GRADER

The Austin-Western Road Machinery Co., of Chicago, furnishes a motor road grader in which the feature to which they call particular attention is that the operator stands at the rear of the machine with the engine in front of him, instead of in the center with the engine behind him, as in other graders; also being far enough behind the blade so that he can adjust the blade and at the same time keep his eye on the road ahead. All of the adjustments of the blade, vertically, diagonally and laterally are made by the operator without moving from his position. The machine is started by means of a side crank, as in the Austin Pup.

The grader is regularly equipped with an 8-foot blade, but a 6-foot blade is furnished for especially heavy grading or a 10-foot blade for snow removal or light maintenance. Where desired, rubber-tired wheels are furnished, or a scarifying attachment hung directly in front of the blade.



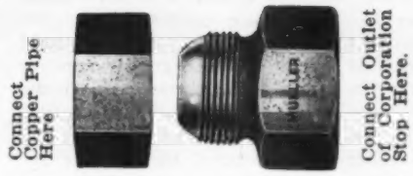
AUSTIN MOTOR GRADER.

COPPER SERVICE PIPE

Mueller Company, of Decatur, Ill., is ready to offer, for water service connections, a pure seamless copper tubing, with connections made by flaring the ends to approximately 45 degrees and clamping them in suitable screwed fittings. For this the company claims ample strength to resist internal water pressure and crushing by backfill; flexibility if the fill settles; that it will not corrode or scale; that it can be installed by men used to plumbing work, and that the cost is so little more than other materials that its economy is beyond question.

Copper pipe is furnished in sizes varying from ⅝ in. to 2⅝ in. outside diameter, corresponding to ½ in. to 2½ in. iron pipe. The bursting pressure varies from 4,500 pounds for the ⅝ in. to 1,680 pounds for the 2⅝ in. This is about three times the strength of "extra strong" lead pipe.

The method of making a joint is shown by the illustration. The pipe is cut to the desired length with a hack saw and the burr reamed out. Place the coupling nut on the pipe; oil the flanging tool and insert it in the pipe; strike it four or five fairly hard blows and remove it; insert the nipple in the end of the pipe, connect the nut and pull it up tight, then loosen it slightly and pull up tight again. Connections are furnished for connecting copper to copper, copper to iron pipe, and to corporation stops.



Nut Spud

FOR CONNECTING COPPER PIPE TO CORPORATION STOP.

TRENCH MACHINE PARTS.

The American Manganese Steel Company of Chicago Heights, Ill., is making a specialty of providing parts for trench and excavating machinery and other machines used by contractors; using manganese steel because it will normally outwear carbon steel, malleable iron or cast-iron and is also possessed of greater strength and resiliency. They state that they have patterns and are equipped to produce practically any trenching or excavating machine parts that should properly be made of manganese steel. An illustration is an excavator link of the channel type for which it claims unequaled strength for resisting pulling and bending stresses, as when passing over the sprocket, rigidity so that it cannot be easily damaged by the striking contact or wedging action of stones, while the channel edges form a straight rail to give a wide rolling surface and keep the buckets in better alignment in bucket frame, eliminating the side sway which shortens the lives of links and rollers. They are fitted with manganese steel bushings of oval contour, which are renewable; and a manganese steel pin with a long T head which fits into a horizontal slot in the link and is protected by the link rail, a square cotter hole at the other end receiving a large square steel holding pin in place of the ordinary cotter pin.

Among other parts manufactured by this company are excavator buckets, excavator sprockets, boom rollers, bucket plows, excavator drive chain, etc. These parts can be furnished for practically all standard makes of excavator or trenching machines.

CROWN ROCK ASPHALT.

The Crown Rock Asphalt Company of Cincinnati, Ohio, has, as its chief product, prepared Kentucky rock asphalt which is guaranteed as to uniformity of quality, thus attempting to correct the chief objection to Kentucky rock asphalt as a road material—its lack of uniformity. This it does by using a run-of-mine rock, leaving unmined, however,

some rough grades of rock, and adding to the material fluxed Trinidad cement so as to produce uniformity in the product when thoroughly mixed and blended with it and also greatly improving the physical properties. It claims for this product that it is much harder than standard rock asphalt, several times tougher and stronger, has greater resistance to compression under test, and greater endurance. The company owns extensive properties on the Illinois Central Railroad at Big Clifty, Kentucky, and can fill orders promptly on short notice.

F. W. D. TRUCK WINCH

Attention has been directed to the increasing use of winches as part of motor truck equipment and the various uses to which they are being put. Winches mounted on F. W. D. trucks, under the rear end of the frame, have been used for drilling wells, loading and unloading heavy machinery, snaking logs out of difficult places, hoisting heavy materials, loading and unloading heavy stones, hauling a scraper in excavating and backfilling, etc. The location under the frame of the F. W. D. truck, the manufacturer claims, prevents its interfering with the loading space, so that it is never in the way and yet is always accessible, and because of its low position it is capable of exerting its maximum pull without twisting or straining the chassis.

THE AMERICAN "BOBBY."

The Griswold Safety Signal Company of Minneapolis manufactures a warning signal to be placed at the center of street intersections and so constructed that it will swing down if struck by a vehicle and allow the vehicle to pass over it. The posts stand 6 feet high and are 7 inches square. They are finished with baked enamel on acid treated steel to secure permanency of finish, and are so constructed that all parts can be reached easily and all are accurately fitted and interchangeable. The traffic regulator with its flashing lights consumes 450 watts per hour, while the warning signal, with a red or amber light burning continuously, consumes 50 watts per hour. The electrical equipment which operates and controls the lights is housed in a cabinet at the curb, while the mechanism which holds the post to an upright position or raises it if pushed down is located underneath the street surface at the post and is not affected by the blow, being contained in a steel drum set in concrete under the pavement.

"AMERICAN BOBBY" TRAFFIC SIGNAL

Eight oil tempered tension springs hold it in an unright position, aided by six equalizing springs.

NORTON POROUS PLATES

The Norton Company of Worcester, Mass., manufactures porous plates composed of electrically fused alumina grains bonded together in the kiln with an aluminous glass. The material is practically unaffected by acid, neutral and slightly alkaline liquors. They are made in three standard grades known as coarse, medium and fine. The chief interest of these plates for engineers probably is in connection with activated sludge tanks. The plates are furnished for both the ridge and furrow and the Manchester types of activated tanks. The makers make a special claim for uniformity of diffusion throughout the entire area of the plate.

The standard plates are 12x12x1-inch and weigh approximately 11 pounds, or 13 pounds shipping weight.

STREET LAMP REFRACTORS.

The Holophane Glass Company, of New York City and Newark, Ohio, manufactures 4-way and 2-way Holophane refractors for lighting. These new refractors turn a large part of the upward light of the lamp downward and a small part of the downward light upward, to obtain ideal distribution for even illumination of the street, as did the old refractors; but the new ones, in addition, redistribute the light laterally or sideways in such a way as to conserve a large part of that which otherwise would be spilled outside of the street area. In this way 40% to 50% more light is thrown upon the street than was possible with the best previous equipment.

They are designed for mounting over the approximate center of the street, usually by wire or mast arm suspension. The 4-way refractor is for use at street intersections, directing the light in four directions, giving even illumination along each of the intersecting streets if the spacing be twelve times the height. The 2-way refractor gives two beams of light in opposite directions.

The refractors are made in a standard 8½-inch bowl size, using the regular Holophane construction—two pieces of glass which nest together, the outside of the inner piece carrying the horizontal refracting prisms, while the inside of the outer piece carries the vertical refracting prisms.

INDUSTRIAL NOTES

ILLINOIS PAVING BRICK MFRS. ASSN.

This association has engaged John M. Egan, Jr., of Aurora, Ill., as chief engineer. He will co-operate in a consulting capacity with engineers, other public officials and the public in general with a view to promoting proper design and construction of brick pavements as dictated by the most modern developments. The headquarters of the association are at Springfield, Ill.

Mr. Egan was educated at the Massachusetts Institute of Technology, and for seventeen years has been engaged in engineering and contracting on drainage, sewerage and paving construction in and around Chicago.

CLAY PRODUCTS INSTITUTE.

An organization with this name was formed on October 16th and 17th by representatives from the American Face Brick Association, Clay Products Association, Common Brick Manufacturers' Association, Hollow Building Tile Association, National Paving Brick Manufacturers' Association and the National Terra Cotta Society. The announced purposes are to develop the clay products industry; provide means for co-operative research work for improvement of its products, reduction of manufacturing costs, and to insure better service and consequent public economies; and to afford a point of contact with government bureaus and such institutions and organizations as may be found to be helpful in carrying out the purposes set forth.

It is created as a federation of the various branches of the clay products industry. The annual meeting is to be held in Washington, D. C., during the fourth week in April. The dues for each member of the association are $500 per annum or less, as the needs may develop.

The officers elected were: Frank Butterworth, general manager of the Western Brick Company at Danville, as president; W. P. Whitney, president of the Springfield Paving Brick Company, as vice-president, and J. S. Sleeper, secretary of the Hollow Building Tile Association, as secretary. The secretaryship will rotate from year to year among the secretaries of the member associations.

WESTERN-ENTERPRISE MERGER

The Enterprise Engine Co. of San Francisco and the Western Machinery Co. of Los Angeles have merged, thus bringing into one organization the two leading builders of internal combustion engines on the Pacific Coast. The purpose is to enlarge the manufacturing facilities, extend the distribution of their products, and improve their facilities for service to power users. The new officials will be: Of the Western Machinery Co.—Wm. Angus, president and general manager; Geo. F. Guy, vice-president; Sam Kahn, treasurer; W. R. Hale, secretary. Enterprise Engine Co.—Chas. J. P. Hoehn, president; H. E. Morgan, vice-president; A. J. Martens, treasurer; Wm. J. Donlon, secretary; Henry Martens, director. The headquarters will be at Los Angeles.

AMERICAN VIBROLITHIC CORPORATION

The American Vibrolithic Corporation, of Des Moines, Ia., announces that Arthur R. Hirst, for seventeen years chief engineer of the Wisconsin State Highway Commission, has been appointed its chief engineer and will devote his entire time to the technical

(Continued on page 42)

(*Continued from page 37*)

Turbines," "Review of Recent Applications of Powdered Coal to Steam Boilers," "Recent Developments in the Burning of Anthracite Coal." On Thursday afternoon, under the heading of oil and gas power, "The Double-acting Oil Engine" and "Gas Turbines;" and under the head of hydraulics, "Methods of Economic Design of Penstocks" and "Study of Draft Tube Design."

ASPHALT CONFERENCE

The third annual asphalt conference, held at Louisville, Ky., on October 13th to 15th, was attended by about 200 representatives of the asphalt industry, contractors and highway and city engineers. About a dozen papers were read and discussed, these covering the subjects of tests of asphalt, construction of sand asphalt roads, gravel bases, black base, and resurfacing and maintenance of roads. Among engineers, at least, the most important paper appeared to be that of Prevost Hubbard entitled, "Research Looking to Improvement in Asphalt Paving Mixtures," in which paper Mr. Hubbard described a simple stability test for asphalt mixtures and for mineral aggregates for such mixtures. E. W. James, of the Bureau of Public Roads, in discussing "Comparable Designs of Pavements," described the procedure employed by the Bureau of Public Roads in obtaining the comparable or equivalent designs of different kinds of roads. In the considerable discussion that followed the general opinion expressed appeared to be that there could be no comparison between things so fundamentally different as different road types.

The conference urged conserving the salvage value of the great mileage of gravel and macadam roads by resurfacing; also widening pavements, eliminating grade crossings, widening and super-elevation at curves, extension of range of vision at road intersections, rigid licensing and control of motor vehicle traffic, to relieve traffic conditions. It adopted resolutions expressing sympathy with the farmers' demand for more moderate-cost tributary and secondary roads.

H. C. Weathers described the sand-asphalt pavements of North Carolina and W. R. Neel Georgia's use of gravel for foundation and asphalt surfaces. C. A. Talley discussed "The Shipment of Asphalt for Paving," the heating and unloading of cars, etc. Other papers were "Building a State Highway System by Bond Issue," by Maj. C. P. Fortney; "Saving Old Roads by Resurfacing," by W. E. Grayson, J. G. Creveling, Jr., and H. F. Harris. Black base pavements were discussed by Benton R. Anderson and K. C. Schmidt. W. B. Fowler opened an interesting discussion on methods of design and mix for portland cement foundations.

HIGHWAY RESEARCH BOARD

The fourth annual meeting of the board will be held Dec. 4 and 5 at Washington, D. C., in the new building of the National Research Council. Thomas H. MacDonald, Chief of the Bureau of Public Roads, will present a paper on the "Financial Value of Highway Research as applied to Road Construction."

The various Committees of the Board will make their reports, which will include the Economic Theory of Highway Improvements; Structural Design of Roads; Character and Use of Road Material; Highway Traffic Analysis; Highway Finance; Highway Maintenance, and also a report of the Special Investigation on Reinforcement in Concrete Roads.

Research apparatus that has been successfully used in various experiments will be on display, including both apparatus used in laboratories, and various loadometers, traffic counters and other instruments in use on road.

On the evening of December 4th, Secretary Hoover will speak at the Highway Research dinner.

Highway executives and engineers will find this meeting to be one of intense interest because of the correlation of research and practise.

Keeping the Telephone Alive

Americans have learned to depend on the telephone, in fair weather or in foul, for the usual affairs of the day or for the dire emergency in the dead of night. Its continuous service is taken as a matter of course.

The marvel of it is that the millions of thread-like wires are kept alive and ready to vibrate at one's slightest breath. A few drops of water in a cable, a faulty connection in the wire maze of a switchboard, a violent sleet, rain or wind storm or the mere falling of a branch will often jeopardize the service.

Every channel for the speech currents must be kept electrically intact. The task is as endless as housekeeping. Inspection of apparatus, equipment and all parts of the plant is going on all the time. Wire chiefs at "test boards" locate trouble on the wires though miles away. Repairmen, the "trouble hunters," are at work constantly wherever they are needed in city streets, country roads or in the seldom-trodden trails of the wilderness.

Providing telephone service for this great nation is a huge undertaking. To keep this vast mechanism always electrically alive and dependable is the unending task of tens of thousands of skillful men and women in every state in the Union.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

BELL SYSTEM

One Policy, One System, Universal Service

and engineering features of vibrolithic concrete pavements and bases.

AUSTIN MACHINERY CORPORATION.

The Austin Machinery Corporation announces that it has removed its general offices from 3500 Dorr Street, Toledo, Ohio, to 1075 Lake Shore Drive, Muskegon, Mich. Orders for repair parts for all Austin machines should be sent to the Muskegon plant.

CATERPILLAR DISTRIBUTORS.

The Holt Manufacturing Company announces the appointment of the Dravo Equipment Company, 1603 St. Clair Avenue, Cleveland, Ohio, as its distributors for caterpillar tractors in eastern Ohio. Also Abbott Motors, Inc., 1400 St. Charles Avenue, New Orleans, La., has been appointed distributing agent for Louisiana and southern Mississippi. Stocks of tractors and parts will be carried by both of these distributors.

J. T. TRACTOR COMPANY.

William C. Batchelder has recently become New England representative of the J. T. Tractor Company; while for eastern Pennsylvania, southern New Jersey and all of Delaware, that company has appointed Staley & Morris of 2009 Market Street, Philadelphia, Pa., as distributors.

BLAW KNOX COMPANY.

This company announces the appointment of Waldemer Duyessen as chief engineer of the furnace equipment and hammer welding departments of the company. Mr. Duyessen is a graduate of the Royal Technical University of Sweden and was employed in blast furnace work there, was for two years with the Bethlehem Steel Company and for nine years with the U. S. Steel Corporation as metallurgical engineer.

The company has also appointed Arthur Levison, formerly highway engineeer with the U. S. Bureau of Public Roads, as chief engineer of the Road-Building Department of the company. Mr. Levison had been with the Bureau of Public Roads since July, 1919.

MECHANICAL STOKER CATALOGUE.

A catalogue which is believed to be unique in one respect at least has just been issued, the unusual feature of which is that it is the joint catalogue of twelve different manufacturers of mechanical stokers. Each manufacturer occupies approximately a page and a half with a brief description of his stoker, illustrated by half-tone and line cuts. Given only this brief space, the manufacturers naturally have confined themselves to a description of the appliance they offer and the chief claims that they make for it.

The catalogue is excellently gotten up. It is divided into three parts—chain grate stokers, underfeed stokers and overfeed stokers. The chain grate stokers described are the Babcock & Wilcox, the Burke Traveling Grate Stoker, the Cox, the Green, the Harrington, the Illinois, the Laclede, the Self-Contained Traveling, and the Westinghouse. The underfeed stokers are the Detroit Single Retort, Detroit Multiple Retort, Jones "Automatic Cleaning," Jones Standard, Jones Side Dump, the Lateral Retort, Jones Industrial Furnace, the Frederick, the Riley, Sturtevant "R" and Sturtevant "S," the Taylor, Type E, Type H, Type K, Westinghouse. The overfeed stokers are the Detroit V type, the Murphy Automatic Furnace and the Westinghouse Roney.

This catalogue certainly should be in the library of every one who is interested in mechanical stokers, whether for waterworks, boiler plants, electric lights or any other.

SNOW LOADERS.

The Barber-Greene Company of Aurora, Ill., has published a pamphlet entitled "Snow Insurance," in which it sets forth the advantages of removing snow from the streets and gives numerous illustrations of the work performed by Barber-Greene snow loaders in various cities. It gives as a list of the users of this loader the cities of Albany, Boston, Camden, Chicago, Detroit, Duluth, East Orange, Madison, Manchester, Milwaukee, New Bedford, Newark, New York City, Philadelphia, Pittsburgh, Poughkeepsie, Providence, Schenectady, South Park Commission of Chicago, Springfield, Trenton, Troy and Worcester.

PERSONALS

Holland, Clifford M., chief engineer of the New York and New Jersey Vehicular Tunnel, died on October 27th, two days before the connecting of the two headings, where he was to have been the principal figure in the celebration. He had been continuously engaged in subway and tunnel work in New York City for eighteen years since his graduation from the Civil Engineering Course at Harvard University.

Boyce, Ernest, formerly assistant engineer of the Missouri State Board of Health, has been appointed chief engineer of the Kansas State Board of Health.

Wells, Charles E., has been appointed city engineer of North Adams, Mass.

Marsh, J. O., formerly office engineer of the California State Highway Commission, has been appointed chief engineer of the Los Angeles Board of Public Utilities.

Kimball, J. H., formerly assistant chief engineer of the Miami Conservancy District, has been employed as consulting engineer on flood prevention work for the city of Cumberland, Md.

Van Norman, H. A., who has been in the employ of the city of Los Angeles for fifteen years, has been appointed city engineer of that city.

Clarkson, Walter J., formerly city engineer of Bayonne, N. J., has again been appointed to that position.

U. S. CIVIL SERVICE EXAMINATIONS

Associate Ordnance Engineer. Applications received until December 16. To fill vacancies in the Ordnance Department. Entrance salary, $3,000 to $3,600 a year. To design gun carriages, caterpillar artillery, cannon, ammunition, inspect ordnance materials.

Junior Mathematician. Applications received until December 16. To fill vacancies in the Coast and Geodetic Survey. Entrance salary, $1,860; promotions possible to $5,000. Required—Graduation with degree from college, with at least 3½ years in mathematics, engineering or physics.

Assistant Business Specialist. Applications received until December 16. To fill vacancies in the Bureau of Standards. Entrance salary, 2,400; possible increase to $3,000. To prepare reports on seasonal operations in the construction industries, editing articles, collecting data.

Junior Cartographic Engineer. Examination on December 3. To fill vacancies in the Coast and Geodetic Survey. Entrance salary, $1,850; possible advance to $2,400. Examination relative to compilation and correction of nautical charts and drawings.

Assistant Lithographer. Applications received until December 9. To fill vacancies in the Hydrographic Office of the Navy Dept. and in the Coast and Geodetic Survey. Entrance salary, $1,500; possible advance to $1,860. Rated on specimens of work in drafting maps and color art work on paper, stone or metal.

Junior Physicist. Examination on January 7, 1925. To fill vacancies in Bureau of Standards. Entrance salary, $1,860; possible advance to $2,400. Requirements—college graduate with degree and at least 118 semester hour credits. Rating on general physics, mathematics through calculus, practical questions, education, training and experience.

Assistant Scientific Aid. Examination on December 10. To fill vacancies in Bureau of Standards. Entrance salary, $1,500; possible advance to $1,860. Examination in advanced general physics, ceramics, chemical engineering, civil and mechanical engineering, electrical engineering, paper technology, physical metallurgy, textile technology, and physics and chemistry.

Chief Architectural Draftsman, Junior Architectural Draftsman. Examinations on January 7. To fill vacancies in Quartermaster General's Office, Washington, D. C. Entrance salaries, $2,400 and $1,680 respectively. Duties of former: to perform difficult free-hand or achitectural drawing, requiring judgment and exceptional skill; of latter, the same, but not demanding judgment or exceptional skill.

NEWS OF THE SOCIETIES

CALENDAR

Jan. 5-6—INTERNATIONAL ASSOCIATION OF STREET SANITATION OFFICIALS. Annual conference at Hotel La Salle, Chicago, Ill.

Jan. 6-9, 1925—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention and road show at Chicago, Ill.

Jan. 12-14—ASSOCIATED GENERAL CONTRACTORS OF AMERICA. Sixth annual meeting at Washington, D. C.

Jan. 21-23—AMERICAN SOCIETY OF CIVIL ENGINEERS. Anual meeting at New York, N. Y.

Jan. 22-24—HIGHWAY ENGINEERS' ASSOCIATION. Eighteenth annual convention at Hotel Statler, St. Louis, Mo.

Feb. 24-27—AMERICAN CONCRETE INSTITUTE. Annual meeting at Chicago, Ill.

April 27-May 1—AMERICAN WATER WORKS ASSOCIATION. Annual convention at Brown Hotel, Louisville, Ky. Secretary, W. M. Niesley, 170 Broadway, New York.

NEW ENGLAND WATERWORKS ASSOCIATION

The November meeting of the Association was held on Nov. 11th and two papers were read, one entitled "Color and Other Phenomena of Water from an Unstripped Reservoir in New England," by Caleb M. Saville; and the other, "Improvement of Filtration Process at Watertown, N. Y.," by F. H. Jennings, chemist of the Water Department of that city.

Mr. Saville stated that when the Nepaug reservoir was built all trees and brush had been cleared off and all vegetable growth cut and burned. There was very little swampy area but a small patch of peaty ground. One brook in the vicinity had such a high color at times that it was called "Brandy Brook." The water from the reservoir showed more or less color at different times, but the amount of this diminished as time passed. He estimated that the water in unstripped reservoirs would cease to show any color in from three to ten years after construction, with six years as the average.

Discussing this paper, Robert Spurr Weston said that the color of the water in unstripped reservoirs depends on the condition of the bottom soil and on the amount and the nature of the incoming water as well as on the amount of vegetable matter left in clearing. Harry W. Clark, director and chief chemist of the Massachusetts Department of Health, said that that department has records of coloration of about sixty reservoirs, and that sometime he hoped these records would be published. He believed that unstripped reservoirs would generally give good results where there was not much swampy land, but that in swampy areas the water might continue high colored for twenty years. Frank E. Windsor, chief engineer of the Providence Water Supply Board, told of color observations made in a Rhode Island reservoir, and Charles W. Sherman told of tests made in a Pittsburgh, Pa., reservoir.

Mr. Jennings' paper was read by Robert Spurr Weston in his absence. It told of difficulties encountered in operating the water filter plant and the remedies adopted. Among these troubles were the mixing of the sand with the gravel, the breaking of strainers and the clogging-up of air distribution pipes. Dry alum feed was adopted to avoid the corrosion caused by alum solution. Following this paper and reports of one or two committees, there was a discussion on the detecting of leaks in mains and service pipes by leak detectors and in other ways.

A tentative program of papers for the Winter and Spring meetings is announced as follows:

Jan. 13th—"Corrosion," by Frank N. Speller, Metallurgical Engr., Pittsburg, Pa.; "Remedial Measure to Correct Corrosion in the Coolgardie Pipe Line in Australia," by Col. Francis F. Longley.

Feb. 10th—A symposium on "Diesel Engines," with the principal paper by C. B. Jahnke, Chief Engr., Fairbanks-Morse Co.

Mar. 10th—"The New Intake of the New Bedford Water Supply," by F. A. Barbour or S. H. Taylor.

Among other papers for which no date is assigned are:

"The Electric Pumping Plant of the Kennebec Water District," by Arthur L. Shaw, of Metcalf & Eddy; "The Case for Fair Rates at Ansonia, Conn," by Nicholas S. Hill, Jr., Consulting Engr., New York; "Some Results of Pipe Cleaning," by Burt B. Hodgman, National Water Main Cleaning Co.

It is proposed by the Executive to devote the last forty-five minutes of each meeting, during the year, to a topical discussion of interest to superintendents. The Executive will welcome suggestions.

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION

The annual meeting of this association will be held on January 21 to 23 at St. Louis, Mo. It is hoped that all companies will bring their sales men and operating men as well as their chief executives. The meetings of these men in groups last year added greatly to the value of the 1923 meeting, and they found so much to confer about that it seemed advisable to continue the meeting through three days this year.

HIGHWAY RESEARCH BOARD

The fourth annual meeting of the Highway Research Board, Division of Engineering, National Research Council, was held in Washington, December 4th and 5th at the building recently erected for the use of the National Academy of Sciences and the National Research Council. This building is devoted entirely to these two scientific bodies, and the finishing touches are still being made upon it. This meeting was held in a room on the ground floor with permanent seating accommodations for about 200, but before the first session had started temporary seats were brought in and placed in the aisles and the front and rear of the room, and 247 were admitted to the room, in spite of which about seventy-five were unable to obtain even standing room. The other three sessions were almost as well attended, taxing the capacity of the room. Sessions were held both morning and afternoon of both days. The large attendance was all the more notable in that the building is difficult of access, being about four miles from the Union Station and several blocks from any trolley line.

In speaking on the subject of "Financial Value of Highway Research," Thomas H. Macdonald, chief of the Bureau of Public Roads, stated as one illustration of such value that at least $10,000,000 had been saved in one year by the use of the new section of concrete pavement resulting from the tests conducted by the State of Illinois. Dissemination of information concerning results of research would tend to minimize non-uniformity in highway construction, which he considered to be the most important matter calling for investigation.

Another matter requiring attention was means for overcoming the belief of many contractors that there was no money to be made in road-building. Of the many federal aid projects that had been carried through, 4,700 were unsatisfactory from a financial standpoint. There were several causes of this, but poor management by the contractor was responsible for 27% of them and unfavorable weather for 33%.

A time study of the procedure of moving dirt which had been undertaken by the Bureau had apparently shown how one contractor could save 9c. per cubic yard by slight changes in his procedure, turning his price of 43c. a yard from a losing to a profitable one.

Prof. T. R. Agg, reporting as chairman of the Committee on Economic Theory of Highway Improvement, stated that the first phase of the investigation of this subject was concerned with tractive resistance. The second was the relation between rolling resistance and the cost of vehicle transportation. Experiments showed variations between 3 miles and 30 miles per gallon of gasoline by the same vehicle on different road surfaces. The committee had under investigation the subjects of tire wear rel-

ative to the kind of road surface, the segregation of air resistance from other tractive resistances, and the relation between rate of grade and power consumed as measured by gasoline consumption. Preliminary tests indicated that balloon tires offered more resistance than cord tires on standard roads, but this additional resistance might be more than compensated by the decreased jar and strain on the vehicle and the driver. In the discussion of this report, description was given of a laboratory test on tire wear by means of a concrete wheel revolved in contact with a tire, the loss by the tire being determined by weighing it. It was found that this loss was one-half to one-third as great as on a concrete road. One set of tests showed a loss of 15 grams in 500 miles in the laboratory test. Cherty gravel was found to give four times as much loss as round gravel. The heaviest loss was caused by irregularity in the road surface which caused the wheel to bound up and begin spinning before striking the road again. Another speaker described tests conducted to determine the power required for driving a machine over gravel, earth and other pavements. It was found that asphalt pavement required 25% more power than concrete with the temperature at 80 to 90 degrees, while smooth gravel required practically the same power as concrete. G. F. Schlesinger suggested as one of the important subjects calling for investigation the determination of when grade-crossing elimination is economical.

Charles M. Upham presented his report as director, in which he stressed the necessity of more scientific economy in road construction. He announced that the Board had arranged to issue "summary bulletins" in which a paper or a report of 10,000 words would be boiled down to perhaps 500. The first of these would be sent out within the next three or four weeks. One of the most important features of the work of the Board inaugurated last year was the appointment by each of the several states of a "Contact Man," who serves as a direct means of contact between the State Highway Department and the Highway Research Board. In several cases the contact man is the state highway engineer or commissioner. Reference was made to a special investigation to be conducted by the Board on the economic value of reinforcement of concrete pavement.

In the afternoon A. T. Goldbeck presented the report of the Committee on Structural Design of Roads, which was discussed by H. E. Hilts and J. C. Sproull. One of the points brought out was the importance of determining the fatigue point of concrete. Experiments seemed to indicate that when repeated stresses were applied to a concrete slab exceeding about 55% of the breaking stress, the slab gradually deteriorated. General Marshall, of the Associated General Contractors of America, made a plea for scientific business research as well as technical research as equally necessary for the satisfactory construction of roads. H. R. Trumbower presented the report of the Committee on Highway Finance, giving figures and diagrams showing the relative amount of the highway financial burden borne by automobilists and others, the amount raised by gasoline taxes, and other data concerning the highway finances of counties, states and Federal government.

Frank Page opened an interesting discussion by a paper, "An Analysis of Defaulted Highway Contracts." He stated that during the construction by North Carolina of its highway program, twenty-one contractors having thirty-five contracts with the State had failed, while a number of others had completed their contracts at a loss. Of these twenty-one contractors nineteen had failed because of insufficient funds. The immediate cause in five cases, however, was neglect of business, two because their bids were too low to permit of any profit, and two were plain crooks. T. J. Wasser, formerly highway engineer of New Jersey and now a contractor, presented the contractor's side of the question, holding that many engineers were unnecessarily severe and could often save a contractor from failure by yielding on certain points which would in no way injure the character of the work or the taxpayer. Mr. Page had expressed the opinion that the bonding companies were in many cases directly and in other cases indirectly responsible for bids that were too low or were made by inexperienced contractors or those with insufficient backing; in reply to which an official of the Maryland Casualty Company, while admitting the truth of some of the criticisms, expressed the opinion that they were unnecessarily severe and also promised that next year would find the companies less deserving of such criticism.

On Friday morning the first report was that of the Committee on Highway Traffic Analysis, presented by G. E. Hamlin. The determination of future traffic is very difficult, involving at least thirteen conditions. Concerning the idea of a "saturation point" in highway traffic, he did not believe that such point would be reached in our lifetime, but that increased use of automobiles and increase in population would prevent this. However, he believed that it was poorer engineering to over-design a road than to under-design one, and engineers should, therefore, be conservative in their estimates of future traffic to be provided for. He called attention to the fact that one obstruction to traffic such as a narrow underpass on a heavily traveled highway or blocking off a part of a concrete road while waiting for repair patches to harden may greatly decrease the capacity of the road by holding back traffic for a considerable distance from the obstruction itself.

Prof. A. H. Blanchard gave a forceful address, discussing "Whether Comprehensive Research Program Is Justified Because of Increase in Efficiency in Highway Improvement and Economic Utilization of Highway Transport," which he answered emphatically in the affirmative. H. S. Mattimore, presenting a report of the Committee on Character and Use of Road Materials, gave it as the opinion of the committee that its function was chiefly that of considering this subject as it was related to the study of highway problems by the other committees. Mr. Hawkins then read a paper on "Economic Selection of Roadbuilding Materials," in which he stressed the importance of using local materials where practicable. The progressive construction of roads using sand-clay, topsoil or gravel during the early stages, followed by bituminous treatment of the sand or macadam was endorsed by one of the speakers in the discussion, and another cited the development of the sand-asphalt roads in North Carolina as a striking illustration of developing previously unrecognized methods of using local materials. (Incidentally, we believe that these were the first references during these meetings to the use of asphaltic materials on highways.)

In the afternoon session, W. H. Root presented the report of the Committee on Maintenance; W. H. Connell read a paper on "The Necessity of Research to Reduce the Cost of Highway Maintenance," G. C. Diffman, a paper entitled "Practical Use of Traffic and Cost Data in Highway Maintenance," and C. A. Hogentogler described "Special Investigations on the Economic Value of Reinforced Concrete Pavement," which are being conducted by the Bureau of Public Roads.

ANNUAL ROAD SHOW AND CONVENTION OF AMERICAN ROAD-BUILDERS' ASSOCIATION

Apparently the size of the annual road show to be held in Chicago January 5th to 9th will be limited only by the space available for the exhibits. Although buildings adjoining the Coliseum have been obtained, the space available for heavy machinery had been over-subscribed 200 per cent. almost a month ago and the space in which light machinery could be installed was 400 per cent. over-subscribed. Consequently, all exhibitors are being asked to reduce their demands for space as much as possible, while some additional space has been obtained by a rearrangement of aisles.

The complete program for the convention, which has just been made public is as follows:

Tuesday morning—Opening address by President Cranford, followed by an address by Thomas H. Macdonald, chief of the Bureau of Public Roads, entitled, "Building a System of National Roads Through Federal Aid." The papers for

the afternoon are: "Impressions of English Highway Practice," by Austin B. Fletcher; "Are State Highway Programs on a Sound Financial Basis?" by H. R. Trumbower; "Legal Aspects of Trunk Line Roads Through Cities and Villages," by Samuel K. Markman; "Suggested Revisions in Brick Paving Practice," by W. D. P. Warren.

Wednesday morning—"Relation of Traffic Surveys to Highway Programs," by William H. Connell. "The Evolution of Highway Traffic," by Arthur H. Blanchard; "The Super-Highway Plans of Wayne County, Michigan," by Edward N. Hines.

Wednesday afternoon—"Planning a Greater Chicago," by E. S. Taylor; "Problems of State-Wide Highway Maintenance," by Frank T. Sheets; "Utilizing the Salvage Value of Old Roadway Surfaces," by A. H. Hinkle. The election of officers concludes the session.

Thursday morning—"Determination of Stability of Asphalt Paving Mixtures," by Prevost Hubbard; "The Contribution of Research to Highway Progress," by Frank Page; "Dust Elimination on Gravel Roads," by B. C. Tiney; "The Final Link in the Lincoln Highway in New Jersey," by Harry D. Robbins.

Thursday afternoon—"Form-Setting and Its Relation to Riding Qualities of Concrete Pavements," by C. N. Conners; "Investigations of Smoothness of Pavements," by H. F. Clemmer; "The Evolution of Construction and Maintenance Equipment," by O. L. Kipp.

The annual banquet will be held on Wednesday evening, January 7th, and other entertainments have already been arranged. C. M. Upham, business director of the Association, opened headquarters at the Congress Hotel on December 1st and these will be maintained until the end of the convention. Information in regard to either convention or show can be obtained at this address at any time.

NATIONAL HIGHWAY TRAFFIC ASSOCIATION

This association held its annual meeting at the Automobile Clubs of America, New York City, on December 2nd. George H. Pride presented the report of the Committee on Weights, Dimensions and Speeds of Tractors, Trailers and Semi-Trailers. The Committee recommended maximum head room of 12½ feet, maximum length of 30 feet for trucks and of 40 feet for semi-trailers, with 60 feet for the maximum length of tractor and trailer combined or any other combination into a single unit. No weight limit or speed limit was recommended. In the discussion it was developed that some states considered a tractor and semi-trailer as one unit, other states as two units, and in New York City one department held one opinion and another department the other.

The subject of "Pedestrian Subways Under State Highways" was discussed at some length, and while a number of those present considered pedestrian underpasses as desirable or necessary, others maintained that practically no one would use them if constructed. Reference was made to the several express stations of the New York City subways which serve as underpasses under the worst traffic points along Broadway but which received comparatively little use as such.

Arthur S. Tuttle, in a paper entitled, "Methods of Increasing Traffic Capacity of Streets," made a plea for the use of arcades where street-widening would be too expensive. He estimated that in Fifth Avenue, New York, an arcade could be built for $250 a front foot and land for the arcade could be obtained at $800 a foot additional. By thus throwing the sidewalks back of the building line and placing the present sidewalk space in the roadway, the number of traffic lanes available for moving traffic in a roadway now 60 feet wide would be doubled. The Secretary of the Fifth Avenue Association and one or two others opposed the arcade plan, the former because it practically destroyed the advertising value of all windows above the first floor. The point was also brought out that the more lanes of vehicles there are in a street, the less the efficiency of each lane.

(Continued on page 50)

PERSONALS

Brown, Perry, at one time city engineer and superintendent of Oakland, Calif., has been appointed city manager of Porterville, Calif.

Tallman, Leroy, works manager at the New Jersey end of the Hudson River vehicular tunnel, died November 30th.

Neff, Edward R., formerly county engineer of Bradford County, Fla., has been appointed city engineer of Miami Beach.

Parsons, Winfield, has been appointed city engineer of Bessemer, Ala., a position recently created by the City Council.

Seabury, George T., manager of the Providence, R. I. Safety Council, has been elected secretary of the American Society of Civil Engineers, succeeding John H. Dunlap, who died last July.

Freeman, Milton H., formerly acting chief engineer of the Hudson River Tunnel Commission, has been appointed chief engineer, succeeding the late Clifford M. Holland.

Whipple, Prof. George Chandler, died suddenly on Thanksgiving morning. Professor Whipple was a member of the firm of Hazen and Whipple, with which firm he retained his connections, although since 1911 he had been professor of sanitary engineering at Harvard University. He was one of the leading sanitary engineers of the country, giving special attention to subjects connected with water supply, and was the author of several standard books on that subject. For ten years he was a member of the Massachusetts Public Health Council; he was a senior sanitary engineer of the U. S. Public Health Service; for several years he was chief of the Department of Sanitation of the League of Red Cross Societies; and he had held numerous other official positions.

Boggs, Joe S., who has been state highway engineer of Kentucky since 1920, has sent his resignation to the Highway Commission to take effect January 1st.

Pilcher, P. P., formerly city manager and city engineer of Winter Haven, Fla., has resigned those positions.

U. S. CIVIL SERVICE EXAMINATIONS

Mechanical Draftsman. Applications received until Dec. 30th. To fill vacancy in the Lighthouse Service and positions requiring similar qualifications. Entrance salary, $2,100 a year. To make drawings for steel structures and mechanical appliances and necessary computations relating thereto.

Valuation Engineer. Applications received until Feb. 28th, 1925. To fill vacancy in Technical Staff of Income Tax Unit of Bureau of Internal Revenue, Treasury Dept. Entrance salary, $3,800 a year. To estimate quantity of natural resource in place; theoretical and market values of natural resource in place and its products; the value of equipment ordinarily used in discovery, exploitation and utilization of such natural resources; and cost of development, exploitation and utilization of such natural resources, with a general knowledge of processes and conduct of the industry.

Assistant Engineering Draftsman (Topographic). Applications received until Jan. 6th, 1925. To fill vacancies in Geological Survey. Entrance salary, $1,500. To make computations for laying out maps or charts and fill in topography from field notes or other sources of information.

Associate Highway Bridge Engineer. Applications received until Dec. 30th. Entrance salary, $3,000 a year. To fill vacancies in Bureau of Public Roads, Department of Agriculture. To superintend construction of bridges of various types throughout the United States, cooperating with State Highway Departments in connection with provisions of Federal Highway Act; also inspection of bridges and investigation of bridge building material, administrative, organization, methods of management, and giving advice as to bridge improvement; surveys of bridge sites, design and preparation of plans of bridges and review of plans and specifications.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

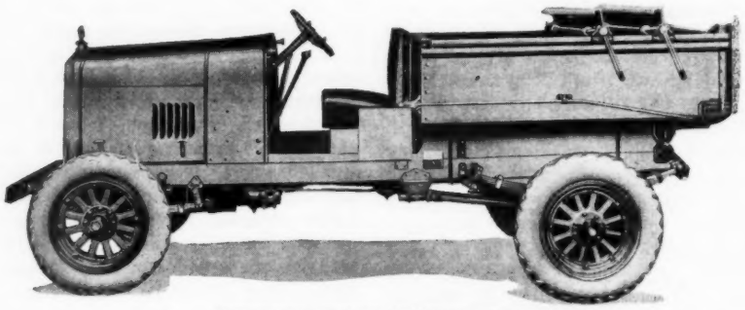
PARADON CHLORINATING APPARATUS.

The Paradon Engineering Company, of Long Island City, New York, furnishes apparatus for controlling the application of chlorine to water and sewage, claiming for its apparatus simplicity, rugged construction, standard fittings, durable finish, self-contained construction, platform scale combination, and vacuum relief.

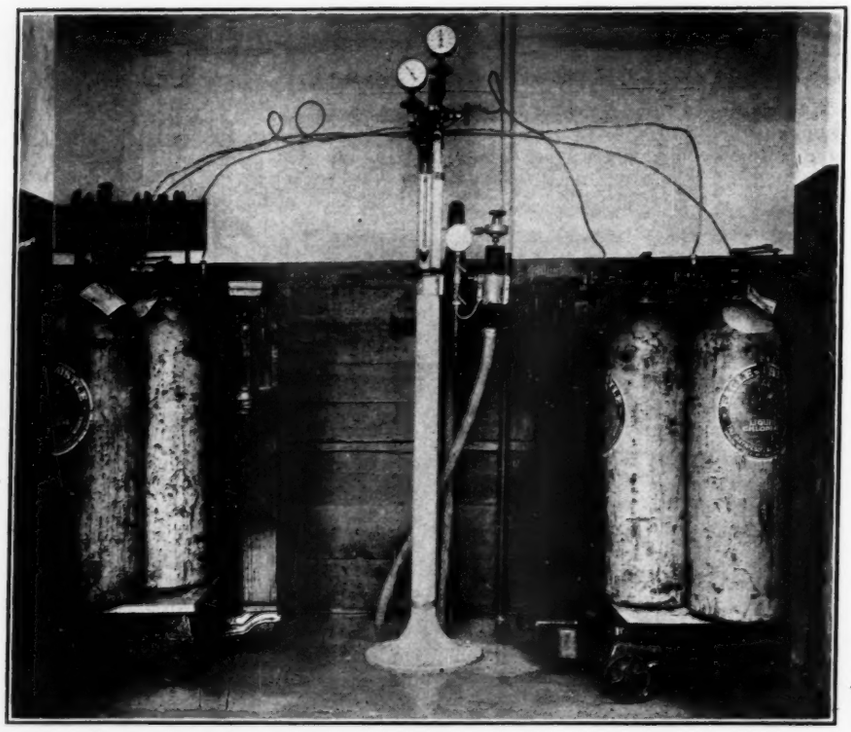
It is said to have less than half as many parts as any other comparable type of apparatus. The makers have used plenty of metal and heavy threads with a view to permitting the apparatus to withstand severe usage. All threads are standard. So far as possible, all parts are finished in white vitrified enamel, which is most suitable for apparatus of a sanitary nature. A Paradon unit may be mounted on a pedestal or a wall bracket, or may be mounted on a white enameled, all-metal, platform scale if desired, an exclusive feature. Another innovation is the vacuum relief which prevents moisture being drawn into the apparatus by the vacuum formed by the absorption of chlorine remaining in a unit when it is shut down.

There are two general types of units—type D being for capacities from 0.3 to 6 pounds of chlorine per 24 hours, and type DB for capacities from 1 pound to 200 pounds per 24 hours. Under each type the chlorine can be applied as dry gas into an open body of water, or as dry gas into a main or other closed conduit against pressures up to 25 pounds per square inch; or it can be applied by an injector using a water pressure of at least 25 pounds per square inch, into either open body of water or a closed body of water under pressure.

A removable chlorine inlet valve in which the seat and stem are a unit and not detachable eliminates the possibility of the valve getting out of adjustment in the field. The flow of chlorine is regulated by the variation of tension of a diaphragm which in turn is connected to the chlorine inlet valve; this making the usual needle valve unnecessary. Both the inner and outer manometer tubes of the chlorine meter are removable. Chlorine is applied either through diffusers as a gas, or drawn into an injector; no glass jar being necessary.



INDIANA ROAD BUILDERS' SPECIAL.



PARADON INSTALLATION AT STAMFORD, CONN.
Treating five million gallons of sewage a day. Maximum capacity, 250 pounds of chlorine.

ROAD BUILDERS' TRUCK

The Indiana Truck Corporation, of Marion, Ind., states that the "Indiana road builders' special" was designed especially to meet the requirements of road building work, as explained to them by contractors. It has worm drive, extra heavy springs and radius rods; 98 per cent of the pay load is on the rear axle. The frame is extra heavy. Very long front springs make easy riding.

A one-man seat prevents anyone from riding with the driver. It also gives space for the carrying of an extra tire as well as the placing of dump body control levers for operating the hoist on the right of the driver. No one can hang on to the truck because of the removal of fenders and running board.

The truck is equipped with special contractors' cord tires, 30x5 front and 34x7 rear. Rims are interchangeable on all wheels, requiring only one spare tire. A special reduction in the steering gear makes operation easy at high speeds.

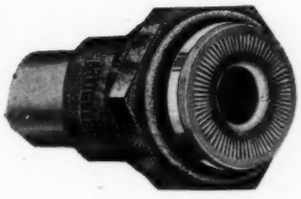
Long control levers are provided for easily shifting gears and applying brakes. To further facilitate easy operation, the spark and throttle controls are placed on top of the steering wheel.

The short wheel base permits the truck to turn on a 16-ft. roadbed by backing once.

Ample power to meet any operating conditions is furnished by the engine, which is capable of functioning at high speeds. A 36-41 cu. ft. body is used, equipped with an underbody hydraulic hoist. Or it can be equipped with automatic tip-over bodies, either rectangular or hopper type.

The frame is of pressed steel con-

E~166



Detail of
Knurled Feature

Maximum Service at Minimum Cost

Water Works Companies throughout the United States have proved that good equipment pays dividends — because it reduces upkeep costs, by saving needless labor. During the past sixty-six years, Mueller Brass Goods have earned the reputation of giving maximum service at minimum cost.

MUELLER
Lead Flange Union Coupling

No. E-166 (here illustrated) is furnished in all sizes from ⅜" to 2". The patented knurled feature insures an absolutely permanent, non-loosening joint. Careful laboratory control insures known standards of excellence in materials and precision in manufacture.

All Mueller Lead Flange Work is thoroughly tested before leaving the factory, and is fully warranted. Write for detailed information and prices.

Mueller Co., Decatur, Illinois, U. S. A.

145-149 W. 30th St., New York; 1072-76 Howard St., San Francisco; 2468 Hunter St., Los Angeles

struction, 5 7/16 deep, 3¼ flange, frame 34 in. wide.

The body has two adjustable swinging partitions and double-acting tail gate. It is 46 in. wide front, 52 in. rear, 72 in. long and 20 in. high. Has 60° dumping angle.

UNION ASPHALT AND SAND MIXER.

ASPHALT AND SAND MIXER

The Union Iron Works, of Hoboken, N. J., manufactures an appliance for mixing asphalt and sand for use in making filler for stone block pavements, producing a hotter and more homogeneous mixture than hand-mixing in a wheelbarrow.

The Union asphalt and sand mixer consists of a mixing drum with paddles set over a firebox for use in cold weather. The paddle shaft is rotated by means of a kerosene or gasoline engine equipped with a magneto. The drive from the engine to the paddle shaft is by means of cut gears with a sliding pinion. The hot asphalt is run directly into the mixing drum, generally from a 500-gallon Union heater, and the sand is put into the hopper at the top of the mixing drum.

The operation of the mixer is practically continuous. It will thoroughly mix more filler in one day than could be mixed by ten men by the old method. The outfit can be run by unskilled labor.

The mixer is provided with 3-inch inlets on either side, and a 3-inch outlet is placed 30 inches from the ground —high enough to allow ordinary steel wheelbarrows to be placed under the valve. The height from the ground to the side inlet is 39½ inches.

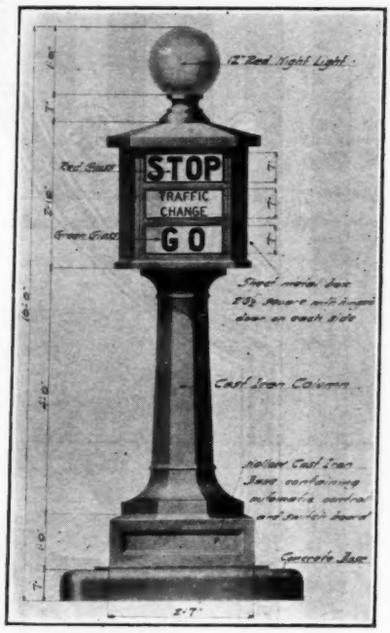
CHEMICAL INDICATORS.

William Kenny and Son Company of Baltimore, Md., supplies indicator solutions for various analyses and tests of water, sewage, etc., including complete colorimetric H-ion outfits.

HARVEY GASOLINE LOCOMOTIVE

The Harvey Motor Truck Works of Harvey, Ill. manufactures a gasoline locomotive for a narrow gauge railway which has been built for heavy-duty service, in the construction of which Ford 1-ton truck parts such as motor, rear axle, steering gear etc., have been combined. Therefore the motor, transmission and jackshaft parts can easily be obtained at the nearest Ford dealer.

This locomotive weighs 5,000 pounds. Gear reductions both forward and reverse are 16.8:1, 46:1 and 70:1. The frame is of rolled steel channels with cast iron end sills provided with coupler pockets suitable for link and pin coupling. The wheels are 22 inches diameter with steel tires shrunk on cast-iron centers. Sand boxes operated from the driver's seat are located at both front and rear ends. Locomotive type brakes on all four wheels are controlled from the driver's seat, these being additional to the regular Ford brake. Driver's cab and electric starting and lighting equipment can be furnished if desired.

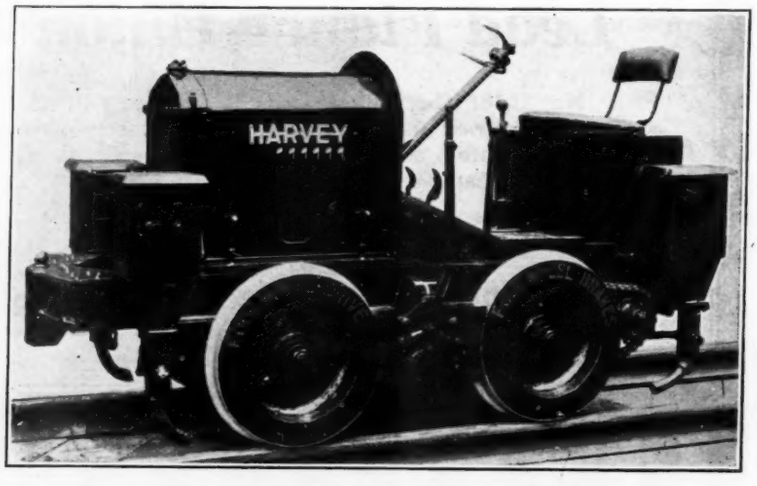


K. & S. TRAFFIC COP.

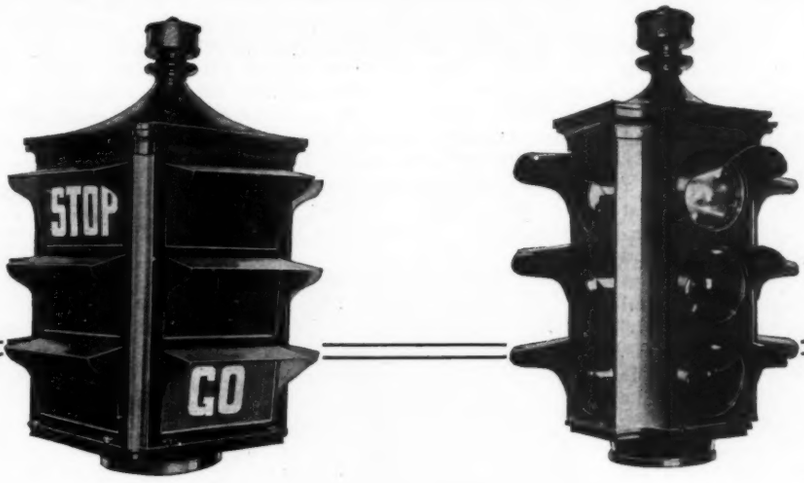
AUTOMATIC TRAFFIC COP

The Klug & Smith Company of Milwaukee manufacturers two types of traffic signals which control traffic either automatically or manually, or both. The first is termed the "Center" type and is adaptable for intersections of sufficient width to permit its installation in the middle of the intersection. The second type is made in units to be placed one at each corner of an intersection, set at the curb to the right of the driver. The company does not furnish overhead or suspended type of signals, as it considers that the driver cannot readily keep his eyes on these and also on the danger point, which is confined to within a few feet of the street surface.

The illustration shows the center signal, which consists of a cast-iron post and a signal cabinet with four sides, each side containing "stop," "go" and "traffic change" signs. Seventy-five-watt lamps are used in the compartments pertaining to the first two and 50-watt lamps in the "traffic



HARVEY GASOLINE LOCOMOTIVE.



SEE THESE TRAFFIC SIGNALS

AT THE GOOD ROADS SHOW

Essco Stop and Go units are now being used by the country's foremost municipalities. Wherever you travel, north, south, east or west, you will find Essco automatic traffic control units guarding and regulating traffic at important city street intersections.

Being pioneer builders of guaranteed traffic equipment it is only natural that certain refinements and improvements, which tends towards greater efficiency, should be found exclusively in Essco products.

If you are unable to visit our booth at the Chicago Good Roads Show, write us now and we will gladly send you complete literature and prices.

ESSCO Manufacturing Co.
114 HARRISON STREET
PEORIA ILLINOIS
Pioneer Builders of Guaranteed Traffic Equipment

change" compartment. In place of the cast-iron base shown in the illustration, these signals are now made for attachment to a concrete base, the top of the base being 2 ft. 6 in. above the pavement and the base being circular, 2 ft. 10 in. diameter at the bottom and 2 ft. 8 in. at the top.

The word "stop" is shown against a red glass background, "go" against green, and "traffic change" against amber. The letters are 4 inches wide and 6 inches high and are legible for about 200 feet in bright sunlight and several squares at night. Each "stop" and "go" panel consists of two plates of glass, with letters sand-blasted on the inside plate and colored glass placed on the outside, the colored glass also being sand-blasted on its inside surface so that the words appear only when the lights are on in their respective compartments.

The automatic control for the center and also for the corner type signal is housed in a metal cabinet 26 inches by 18 inches by 12 inches high supported on a concrete base and located on the sidewalk just inside the curb or at other convenient location. The signals are operated by a Reco flasher and motor made by the Reynolds Electric Company, to which is attached an instrument board containing the necessary fuses and indicating switches for the motor night light and the various changes of timing; three changes of timing being provided for each intersection.

The corner type signal is constructed similar to the center type, but has only one face for the command of vehicular traffic, the back face being arranged for the benefit of pedestrians with bullseye lenses showing red for "stop" and green for "go."

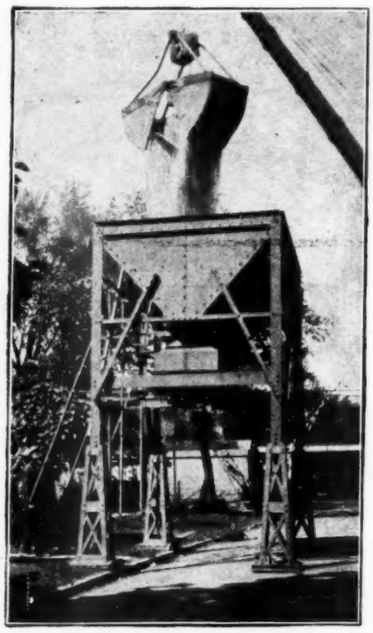
The signal cabinets for both types are constructed of galvanized iron dipped in rustproof paint followed by three coats of enamel.

The center type is equipped with an 8x14 all-red globe, illuminated all night with a switch arrangement which is independent of the automatic control device. Where the "no left turn" rule is enforced, an 8x16 globe is furnished with these words sand-blasted in white letters on a red background on all four sides. For the corner unit the "no left turn" globe is made 6x16 of flat canteen shape with the words sand-blasted on two sides. During the operation of either the center signal or four units of the corner signal, eight 75-watt lamps are in continuous service and eight 50-watt lamps are in service for six seconds in every minute. A 75-watt lamp for the top light is in service at night.

The apparatus can be set to operate in any desired way; for instance, east and west traffic may have the "go" sign for 40 seconds at a time in the morning and 20 seconds in the afternoon, while north and south traffic has any different intervals desired. Five seconds before any change the words "traffic change" are flashed.

BIN FOR CONCRETE AGGREGATES

A semi-portable bin is manufactured by the Butler Equipment Company of Waukesha, Wis., which has several special features. One of these is that the bin can be picked up by a crane and placed straddling a truck when it is desired to move it to another locality, the bin being mounted on pedestals to facilitate this. When removed from the pedestals (by removing four bolts only)



BUTLER BIN FOR CONCRETE AGGREGATES.

and placed on a truck, the height will permit its passing under trolley wires, viaducts, etc.

The bin is divided into two compartments for sand and stone, respectively, each bin being equipped with two measuring hoppers. When an industrial railway is used carrying batch boxes, these double bins permit loading sand into two boxes on one car and stone into two boxes on the next car at the same time; while if trucks are used with batch compartments, two can be filled with stone without moving the truck, and then the truck can be spotted under the sand bin and receive two batches of sand. As the bin is on corner pedestals, trucks or cars can pass through it in either direction. The bin has a capacity of 16 cubic yards and weighs approximately 8,000 pounds.

ARMSTRONG STEAM TRAP.

The Armstong Machine Works of Three Rivers, Mich., has just introduced a steam trap for high pressure and superheat installations, calling for steam traps of exceptional strength and ruggedness. They are made of high grade steel castings with a tensile strength of approximately 70,000 pounds, thoroughly annealed. The traps are tested up to 3,000 pounds. They are made for pipes from ¾-inch to 2 inches, with capacities from 62 gallons per hour to 1,022.

THE INSLEY EXCAVATOR

The Insley Manufacturing Company of Indianapolis furnishes an excavator with ditcher attachment designed for excavating sewerage and drainage ditches and basements. The dipper will handle a half-yard of material and the excavator is said to have an average daily capacity of from 200 to 400 yards.

The dipper arm is mounted on the end of a boom which can be raised and lowered as required. The dipper is pulled toward the machine instead of being filled by crowding action, as with a shovel. The boom can be swung through an arc of 220 degrees, and the machine has a reach of 23 feet on either side and can dig to a depth of 10 feet below the wheels in front and 8 feet at the sides. As the machine backs away from the work, it can dig to this depth while remaining on the surface on solid ground. When used to load trucks, the bucket can be made of the drop bottom type.

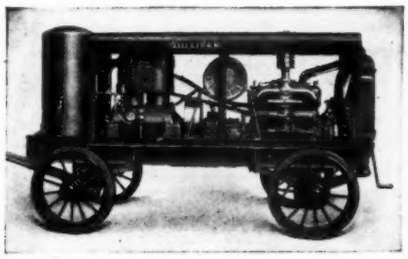
The excavator will dig a trench 28 inches wide with a standard bucket, or as wide as 36 inches with a special bucket. The material excavated can

INSLEY EXCAVATOR WITH DITCHER ATTACHMENT.

Sullivan Road Building Equipment

Look For It At The Road Show

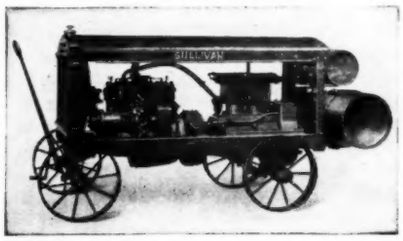
Sullivan Portable Compressors



"WK-311," 170-ft. Compressor, on Trailer Truck, Rubber Tires

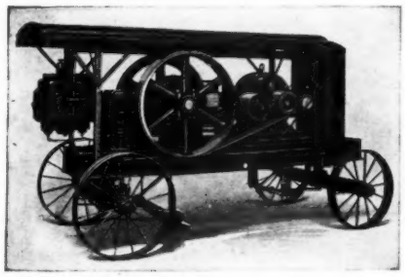
Built in 3 types, for gasoline engine, electric motor, and tractor drive, as listed below.

Compressors have "wafer" valves, water cooled cylinders, automatic lubrication and unloading devices, to economize power.



103-ft. "WK-312" Compressor, on Steel Wheel Truck

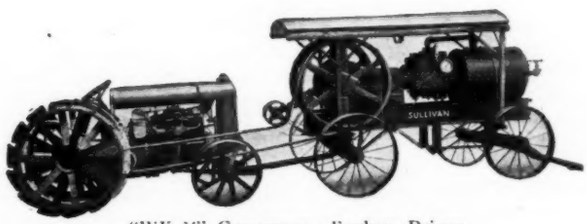
Gasoline types are direct connected to Buda. 4-cylinder, 4-cycle engines. Standard trucks have steel wheels, but trailer-type trucks with spring suspension and rubber tires may be had; also skid mounting. This last may be carried on a one-ton truck.



"WK-32" Motor-Driven Compressor

Capacities, 100 cu. ft. and upward. Distinguished by power economy, and excellent wearing qualities, embodying the experience of 15 years in building portable air compressors.

Bulletin 3377-N



"WK-34" Compressor, Fordson Driven

Sullivan Hammer Drills—Rotators

Sullivan Rotators are 38 lb. one-man, self-rotating hammer drills, equipped with steel retainer and automatic lubrication and requiring ⅞-inch solid or hollow drill steel. They are recommended for any drilling work encountered in highway or street construction, such as cutting trenches, deep drilling in quarries, block holing or horizontal toe hole work on high benches. In addition to several compressed air types, a steam drill is available. Rotators are noted for their great drilling speed, relative freedom from vibration and ability to stay on the job. *Bulletin* 3381-*B*.

Concrete Breakers

The Sullivan "DB-221" "Buster" is a 65-lb., non-rotating hammer drill, intended for cutting asphalt or breaking up concrete pavements, walls, etc. It handles 1⅛-inch steel tools with either bull point or chisel edge. A steel retainer keeps the tool in position. The throttle is of the press down-lever type and is situated in the handle. The valve and piston motion gives a very powerful, snappy blow, and the tool operates with little vibration. *Bulletin* 3381-*D*.

Pneumatic Spaders

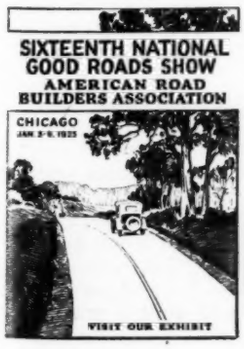
Sullivan Clay Spaders are light, but substantial, compressed air tools for taking the place of picks and shovels in excavating hard clay. For digging culverts or other underground work, a short steel spade is provided. For outdoor work in trenches, etc., a long shanked spade is furnished. The tool without the spade weighs only 16 lbs.

A knurled retaining bushing keeps the spade in the chuck. *Bulletin* 3370-*X*.

Drill Sharpeners

When the contractor is operating several drills continuously, the question of sharp drill steel is important. The Sullivan Class "B" 1500-lb. all hammer drill sharpener will enable him to keep his drill steel in prime condition for use, with a minimum of labor and expense. The machine occupies a space of 4x2½ feet and is operated by compressed air. Send for *Bulletin 3372-H.*

TEAR OUT THIS PAGE and keep it for reference. Use the coupon to ask for the Sullivan Catalogues and for quotations. Let us know your address and we will have our local representative call on you.



SULLIVAN
TRADE MARK
MACHINERY COMPANY
138 So. Michigan Ave. Chicago.

Send your catalogues on:

.....

To .....

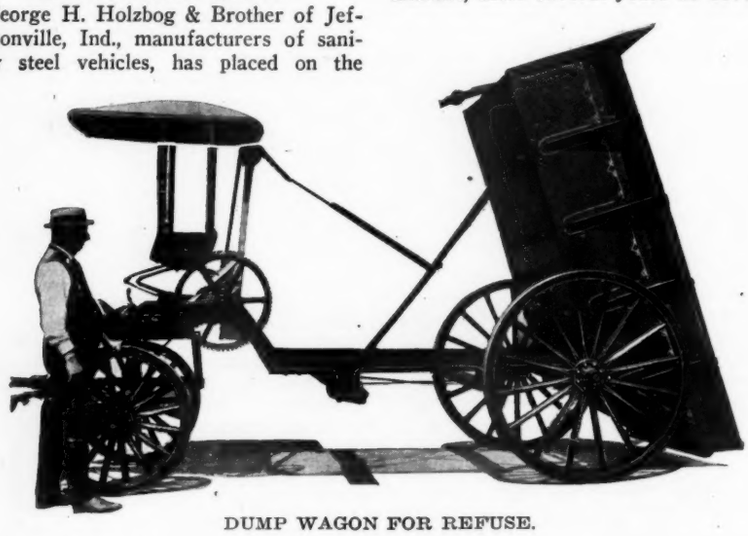
P. O. .....

.....

be cast to either side to a height of 10 feet. For backfilling, the excavator can be used with a shovel attachment. It can be operated entirely by one man, and is said to have a low fuel consumption, making it very economical in operation.

REFUSE DUMP WAGON

George H. Holzbog & Brother of Jeffersonville, Ind., manufacturers of sanitary steel vehicles, has placed on the market a dump wagon especially adapted for hauling garbage and refuse to be dumped into incinerators or barges. To accommodate bulky refuse the wagon body has extra capacity and a low hanging bed. The wagon is built with end dump, hand-operated. It is built of 5 cubic yards capacity for two horses and 3-cubic yards for one horse. The sides have hinged wings that are dropped down when heavy material is being hauled or until the body is half filled. The height from the ground to the top of the bed on the smaller wagon is 48 inches and on the two-horse wagon 58 inches, not including the drop wings. There is a sliding step or platform on which the loader may rest the barrel or box he is lifting into the wagon. The frame of the gear is constructed of steel angles and the wheels are of the Archibald iron hub pattern, calculated to give long life to the wagon.



DUMP WAGON FOR REFUSE.

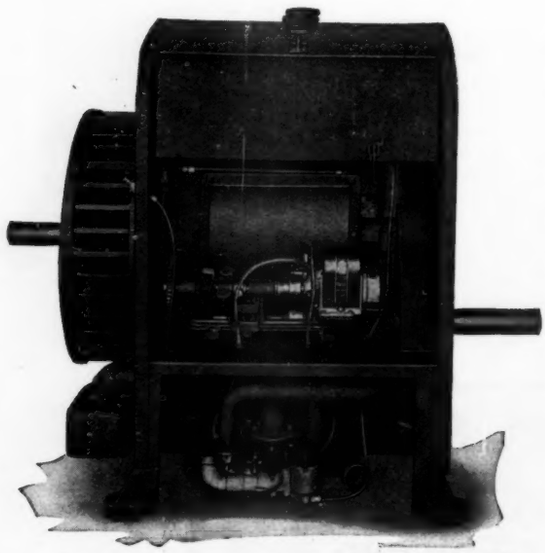
DENISON POWER MAKER

The Cook Motor Company of Delaware, Ohio, has recently placed on the market, after several years of development, the Denison Power Maker, which is a new type of internal combustion engine designed especially for contractors' equipment. It is an inverted, two-cylinder, four-cycle, water-cooled engine entirely housed in a 16-gauge pressed steel casing. The cylinders, bearing standards and base are all included in one casting, which makes the unit very rigid and insures permanence and proper alignment of piston, crankshaft and camshaft. The shaft, magneto, governor assembly and connecting rods are all very accessible for inspection and adjustment.

Cooling water from the radiator upon entering the cylinder block strikes the cylinder head, which is the hottest part of the unit, and rises as it is heated, producing rapid circulation of the water and uniform cooling. The fuel tank is located at the top of the housing.

The inverted cylinder construction is claimed to eliminate crankcase oil dilution and to enable the engine to be operated on kerosene as well as gasoline.

Power can be taken from the crankshaft at speeds ranging from 500 to 1,200 r.p.m., and from the gear reduction shaft at speeds ranging from 250 to 600 r.p.m., giving a power range of from 5 to 12 horsepower from either shaft. The base is 28¾x25¾ and the height 33 inches. The weight is 550 pounds.



FRONT VIEW OF DENISON POWERMAKER WITH FRONT COVER REMOVED.

INDUSTRIAL NOTES

LINK-BELT COMPANY WAREHOUSE

The Link Belt Company of Chicago has erected a new warehouse and office building at 5938 Linsdale Avenue, Detroit, to which the Detroit branch has moved from its former quarters on Woodward Avenue. The new structure, a 2-story building, contains a large warehouse where standard Link-Belt and H. W. Caldwell & Son Company products are kept in stock, these including various types of chains for elevating, conveying and power transmission purposes, sprockets, clutches, malleable iron elevator buckets etc.

RESURFACING MACADAM AND GRAVEL ROADS

The Texas Company, through its asphalt sales department, is distributing a new booklet in order to inform engineers and public officials of when and how to resurface worn macadam and gravel roads and streets by using them as foundations for asphaltic wearing surfaces. A copy may be secured by addressing the Texas Company, Asphalt Sales Department, 17 Battery Place, New York City.

FIFTY-TWO YEARS OF OSGOOD SHOVELS

The Osgood Company of Marion, Ohio has published a 16-page pamphlet giving a brief history of the company during the fifty-two years of its existence, including its development of power shovels and dredges, with illustrations of those used in the '80s and before.

CATERPILLAR DISTRIBUTORS

The Holt Manufacturing Company of Peoria, Ill. has appointed as distributors for caterpillar tractors in the western part of Missouri and the state of Kansas The Weber Implement and Automobile Company, its distributors at St. Louis, which has established a branch office at 2047 Main Street, Kansas City, Mo. This branch office of the Weber Company will be under the management of R. R. Powers, formerly district manager for the Holt Company. The entire sales and service organization of the former branch of the Holt Company has become associated with the Weber Company.

As distributors for western New York, the Holt Manufacturing Company has appointed Haverstick & Company, Inc. with office at Ford and Spring Streets, Rochester, N. Y.

PAWLING & HARNISCHFEGER CO.

This company announces the appointment of N. P. Farrar as assistant sales manager and H. L. Mode as sales representative in the eastern territory with headquarters at New York and Philadelphia. Mr. Farrar has been district manager of the Philadelphia territory for P. & H. Mr. Mode has had seventeen years' experience with electric traveling cranes and motors.

4 GOOD BOOKS

BY

A. PRESCOTT FOLWELL

Past president American Society of Municipal Improvement; Member American & New England Water Works Associations; Member Society for Promotion of Engineering Education; Editor, PUBLIC WORKS.

For City Engineers and Superintendents of Water Works, the following books contain a wealth of experiences:

Sewerage

The Designing, Construction and Maintaining of Sewerage Systems and Sewage Treatment Plants. This rewritten edition, which has been brought strictly up-to-date, devotes more space than heretofore to calculating of the sizes of sewers, especially of storm sewers, the pumping of sewerage, etc.
Eighth Edition, Rewritten and Revised; 473 pages.
Cloth $4.00

Practical Street Construction

A new book devoted to the practical design and construction of streets. This is the only book treating of alignment, grade and cross-section, the location of sewers and other underground constructions, the above ground appurtenances, such as manholes, fire hydrants, fire alarm boxes, street signs, and other features of modern city streets.
242 pages. Cloth.....$2.00

Municipal Engineering Practice

The subject matter in this book fills the gaps that have been evident in municipal engineering literature, such as street lighting, waste disposal, comfort stations, etc. The author has also covered both the theory and the detailed practice of the other fields in which the municipal engineer is interested.
422 pages, 6 by 9. Cloth.....$4.00

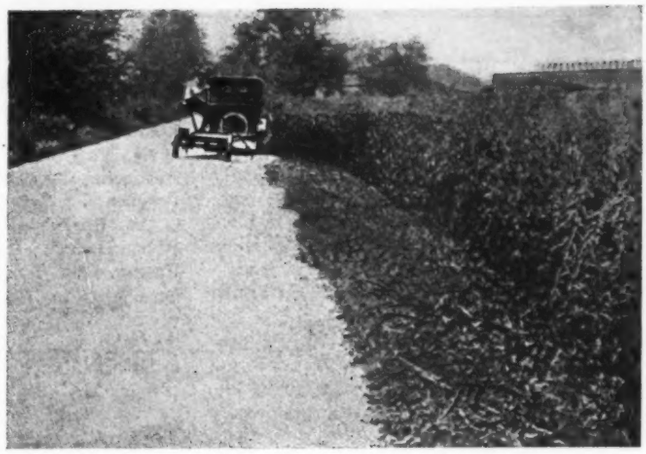
Water-Supply Engineering

The Designing, Construction and Maintenance of Water-Supply System, both City and Irrigation. Covering every feature of the supplying of water for municipalities. The present edition contains much new matter and embodies the most recent practice and discoveries.
484 pages. Cloth.....$4.00

ORDER FROM

PUBLIC WORKS BOOK DEPARTMENT

243 WEST 39th STREET
NEW YORK CITY



RAWLS ALL STEEL HIGHWAY MOWER

Highways in 14 states—85 railroads in eight different countries—use RAWLS Mowing Equipment. Sixty-five machines are in use on some roads.

Their growing pouplarity is due to the tremendous satisfaction they give wherever used.

Specifications:

Solid Rubber Tire Steel Wheels
Hyatt Roller Bearings on Axles
5, 6 or 7 foot Cutterbar
All Steel Castings
4" Channel Steel Frame
2" Floor
1 7/16" Steel Axles.
Cold Rolled and Nikrome Steel Drive Shafts
Movable Parts fitted with MANGANESE BRONZE Bushings
Speed 6 to 8 miles per hour while mowing—equivalent to 3 or 4 gray iron farm mowers.

Cuts Any Angle—Even, Straight, Up or Down

Demounts Automatically When Obstructions Are Met

If you are having trouble with the vegetation along the side of and adjacent your roadbed, clogging the drains, holding the moisture in the shoulders which softens the foundation and makes heavy tonnage more hazard to hard roads, we assure you, you will make no mistake in placing your order for this equipment at your earliest convenience.

Write for Descriptive Literature

RAWLS MACHINE & MFG. WORKS

1412 North Halsted Street, Chicago, Ill.

Cable Address: Rawlsmachy, Chicago
Codes: A B C, 5th Ed. and Private

(*Continued from page 41*)

Professor Blanchard spoke on "State Fees for Commercial Motor Vehicle Private and Common Carriers." He apparently believed that the amount of fees paid by both should be practically the same as otherwise the large merchants with private trucks would have the advantage. In closing the session, Professor Lewis W. McIntyre read a paper entitled "Enforcement of Traffic Regulation by the Utilization of a Police Traffic Bureau," in which he presented a most complete scheme for a bureau of traffic relief, describing the system employed in Pittsburgh, where the planning is done by engineers, there being a chief engineer and assistant engineer of the bureau, while the carrying-out of the regulations would be in the hands of a traffic squad under the police department, but composed of men selected especially for this service.

In the evening E. P. Goodrich presented a paper entitled, "Methods of Forecasting Future Traffic and the Saturation Point in the Utilization of Motor Vehicles." This paper will be published in an early issue of PUBLIC WORKS. Russell Huffman spoke on "Compulsory Automobile Liability Insurance," presenting the arguments both for and against it. The general opinion seemed to be unfavorable to compulsory insurance. The session closed with a discussion of "Solutions of the Parking Problem in Congested Districts of Municipalities," by Prof. R. L. Morrison, C. A. Hirschberg (who had brought to the hall a model of the garages patented by the Ramp Buildings Corporation) and several others. The morning session was attended by about thirty and the evening session by about thirty-five.

NEW JERSEY SANITARY ASSOCIATION

This association held its fiftieth annual meeting at Atlantic City, N. J., on December 5th and 6th. H. T. Critchlow, speaking on "Where Will the Water Supply Come From Twenty Years From Today?", referred to the Hazen plan for furnishing water for northern New Jersey; in discussing which Morris Sherrerd stated that the North Jersey Water Supply Commission was studying the Chimney Rock site for the reservoir in place of the Long Hill, it being estimated that the cost of the former would be about $17,000,000 less than the latter. Among other papers read was one by James E. Brooks on "Sanitation for the Camper and Hiker," in which he outlined precautions necessary for sanitary water supply and waste disposal of outdoor camps.

IOWA SECTION AMERICAN WATER-WORKS ASSOCIATION

This section met at Iowa City November 6th to 8th, when about twenty papers and motion picture talks were listened to. Among the papers read were one on "Treatment of Railroad Supplies," by C. R. Knowles; "Operating the Softening Plant at Topeka, Kans." was described by N. T. Veatch; "Differentiation of B. Aerogenes by Chinic Acid," by B. H. Butcher; "A New Test for Nitrates," by G. W. Burke; "Protection of the Cedar River Drainage Basin," by Prof. C. O. Bates; while more or less general discussions were had on the subjects of the prevalence of unsafe water supplies in the State and the difficulties experienced by small municipalities in obtaining competent engineering advice.

The officers for the coming year are: Chairman, Max Levine; vice-chairman, H. V. Knouse; directors, N. T. Veatch and J. W. McEvoy. J. J. Hinman, Jr., continues as secretary.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS

This association held its tenth annual convention in San Francisco, November 17th to 20th. Delegates were present from 38 states and the territory of Hawaii, a total of 276 having registered.

The officers elected for the ensuing year were: President, Frank F. Rogers; vice-president, Frank Page; treasurer, Frank T. Sheets; secretary, L. D. Blauveldt; executive committee, C. M. Babcock, Thomas H. Macdonald and F. R. White.

Among the papers were the following: "How Shall Interstate Highways Be Named and Marked?", by A. H. Hinkle; "The Urgent Need of Uniform Traffic Laws and Public Safety Devices," by Thomas H. Macdonald; "To What Extent May a State Economically Issue Bonds for Road Construction?", by Frank T. Sheets; "Highway Transportation Surveys," by J. Gordon McKay; "Problems of Mountain Road Location," by James Allen; "Some of the Recent Conclusions in Highway Research," by A. T. Goldbeck; "The Value of the Practice of Weighing Concrete Aggregate for Pavement Construction," by R. W. Crum; "Convict Labor in Highway Construction," by R. M. Morton; "Needed State and National Highway Legislation," by Harvey M. Toy; "Report of the Committee on Traffic Control and Safety."

EASTERN PAVING BRICK MANUFACTURERS' ASSOCIATION

At the Annual Meeting of the Eastern Paving Brick Manufacturers Association, held in New York City on December 9th, the following officers were elected: President, R. L. Winslow; Treasurer, R. T. Hutchins; Secretary, Wm. C. Perkins; Vice-Presidents, W. W. Cunningham, F. L. Stowell, C. C. Blair and J. W. Hall; Governor, C. P. McFadden; Alternate, D. R. Potter.

In the evening the Get-Together Dinner was held in conjunction with the Eastern Clay Products Association.

INDUSTRIAL NOTES

(*Continued from page 48*)

SNOW LOADER SALES

The Barber-Greene Company has recently sold snow loaders to the cities of Rochester, Utica, Worcester, White Plains, Kingston and Buffalo (the last purchased 2 snow loaders and 2 trailers). The Boston Elevated Railroad recently purchased its third machine.

SULLIVAN MACHINERY CO.

Beginning December 1st the Cleveland office of the Sullivan Machinery Co., Ralph T. Stone, district manager, is situated at Room 701, Rockefeller Bldg., instead of Room 824, its former address.

NEW FELLOWSHIP IN HIGHWAY ENGINEERING

The United Fuel & Supply Company of Detroit has established a fellowship in highway engineering at the University of Michigan to provide for investigations into advisable methods of sampling and testing sand and gravel to be used in connection with highway improvement.

SULLIVAN EXHIBIT AT ROAD SHOW

The Sullivan Machinery Company of able compressor, 200 cubic feet displacement, at its booth W-11, west wall, main floor of the Coliseum. It will also show a 103-foot Buda engine-driven, 2-cylinder, portable compressor on a highway trailer truck. A semi-portable compressor on skids will supply compressed air for running an exhibit of drills and other compressed air tools. Joseph H. Brown will be in charge of the exhibit, assisted by C. S. Munns, R. E. C. Martin, E. W. Noyes, H. L. Bernard and Clifford Christianson.

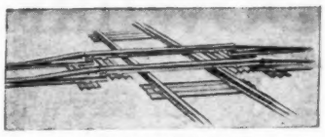
BOSCH MAGNETOS

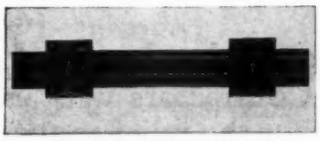
The American Bosch Magneto Corporation of Springfield, Mass., will exhibit at the Good Roads Show its line of standard magnetos, starting motors, generators, magneto attachment for Ford trucks, DeLuxe battery ignition system for Fords and Type 600 Ford ignition system; also magneto attachment for Fordson tractors, governor for Fordson tractors, and spark plugs.

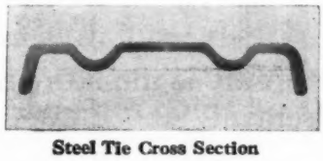
LUBRICATION OF FIRE APPARATUS

The Seagrave Company of Columbus, Ohio, has issued a booklet entitled "Correct Lubrication of Seagrave Motor Fire Apparatus," in which it describes the Seagrave engines and the kind of oil most suitable for each bearing. It states that it has "found that Gargoyle Mobiloil, manufactured by the Vacuum Oil Company, will give entirely satisfactory service when the grades listed below are used with the proper units and used properly."

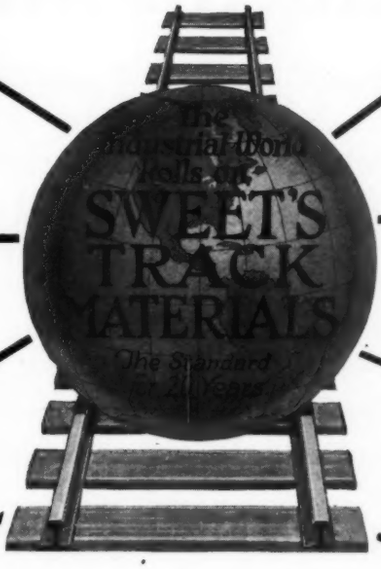
For Permanent or Portable Track


Track Climbers

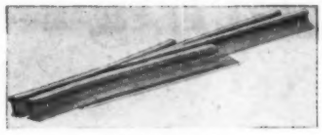

Combination End Joint

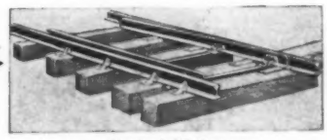

Steel Tie Cross Section

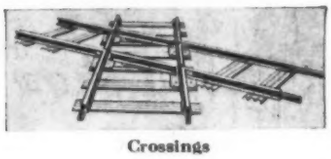
Steel Track

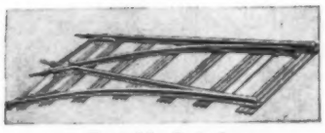


Write for Descriptive Catalog


Riveted Frogs


Switch Points


Crossings


Portable Switches

Sweet's Steel Company • **WILLIAMSPORT PA.**

25 YEARS' EXPERIENCE IS BUILT INTO THIS HEATER

Notice the simple, sturdy lines.

Odd shapes and freak designs have never increased the life or usefulness of a heating kettle. A quarter century of study, experimentation, and constant watchfulness of every new need and development in the building of heaters is reflected in the rugged design of the UNION.

The construction insures long service and incorporates every needed convenience.

Two side outlets are provided, and one in front or rear if desired.

This outfit is equipped complete with drawoff valve, stack with damper, draw bar and covers.

In the Union Road and Street Portable Heater nothing unnecessary is included; nothing essential is omitted

UNION IRON WORKS
HOBOKEN, N. J., U. S. A.

Lower Paving Costs for 1925 by Curing Pavements with Dowflake

See Our Exhibit at the Road Show

Municipalities and paving contractors can save a lot of money and simplify concrete curing by keeping Dowflake on hand all the time.

There is no further need to carry the burdens of the old fashioned curing methods. Contractors who use Dowflake cannot say enough about the relief to them that comes from having for the first time a really scientific curing method.

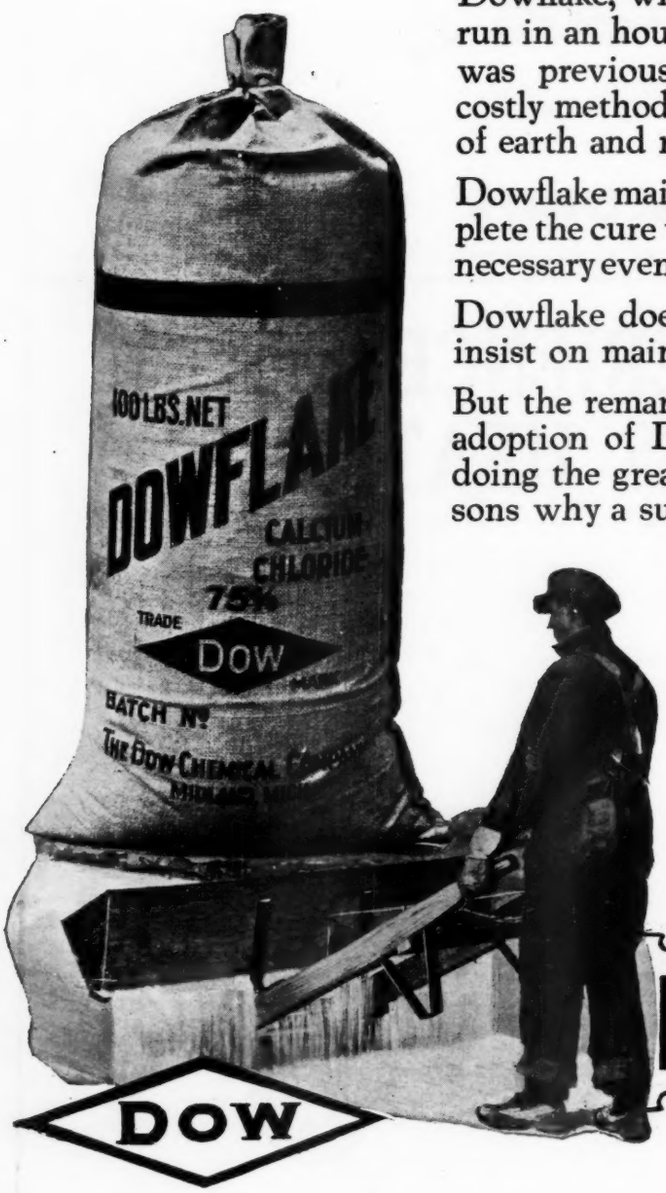
The sole requirement for the best cure is moisture to complete the action within the cement.

Dowflake, which one man applies to the day's mixer run in an hour, supplies the necessary moisture which was previously secured by laborious, tedious and costly methods with miles of pipe lines and hose, tons of earth and many full time laborers.

Dowflake maintains the moisture long enough to complete the cure where previously regular moistening was necessary even with plenty of earth and straw covering.

Dowflake does not dry out so needs no inspector to insist on maintenance of moisture.

But the remarkable properties which have caused the adoption of Dowflake as the standard cure in states doing the greater part of paving are not the only reasons why a supply of Dowflake becomes so essential.



It speeds up curing and, therefore, is extremely valuable late in the season.

It simplifies and hurries up the patching jobs.

Read the New Book "How To Cure Concrete" —Write for a copy now if you haven't received one yet.

THE DOW CHEMICAL COMPANY
141 Water Street · MIDLAND, MICHIGAN
Branch Sales Offices:
90 West Street, New York City — Second and Madison Sts., Saint Louis

KEEP ROADS UP AND TAXES DOWN WITH
DOWFLAKE
CALCIUM CHLORIDE

Save Gravel Road Surfaces With Dowflake Maintenance

Every year thousands of miles more of gravel and stone road have been put under Dowflake maintenance. Hundreds of thousands of dollars in resurfacing costs have been saved.

Dowflake with its continuous moisture bond saves the surface. As long as the surface stays the road can't go to pieces—the metal cannot seriously pit and break through.

And with more thousands of miles of Dowflake road many more thousands of motorists and roadside dwellers are going to their highway officials and are writing us, saying—"the dust prevention alone is worth more than Dowflake maintenance costs."

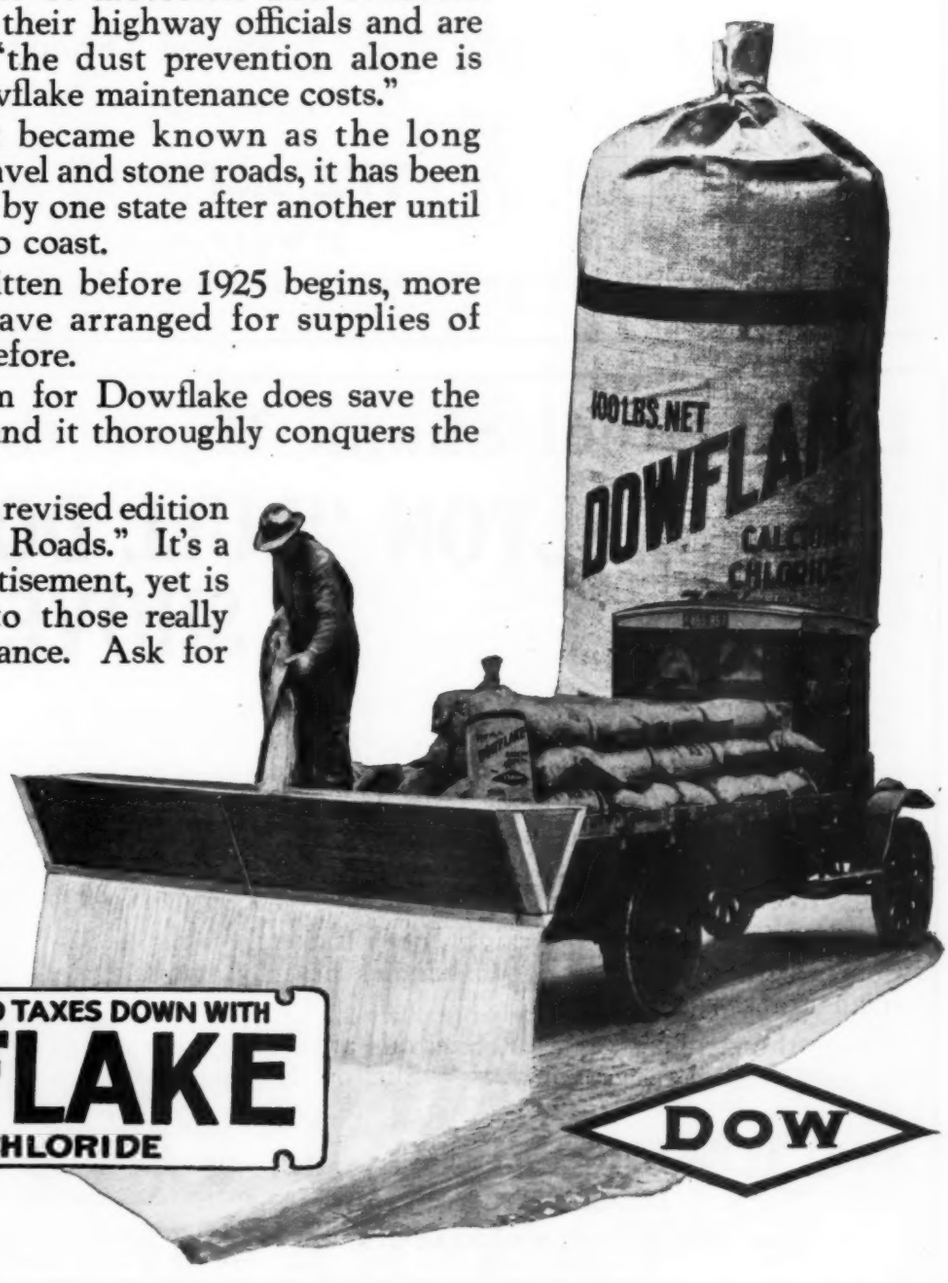
Since Dowflake first became known as the long sought preserver of gravel and stone roads, it has been approved and adopted by one state after another until it is used from coast to coast.

Already as this is written before 1925 begins, more highway divisions have arranged for supplies of Dowflake than ever before.

Satisfaction is uniform for Dowflake does save the road, it saves money, and it thoroughly conquers the dust nuisance.

Write for the new and revised edition of "How To Maintain Roads." It's a manual—not an advertisement, yet is mailed without cost to those really interested in maintenance. Ask for your copy.

See Our Exhibit at the Road Show



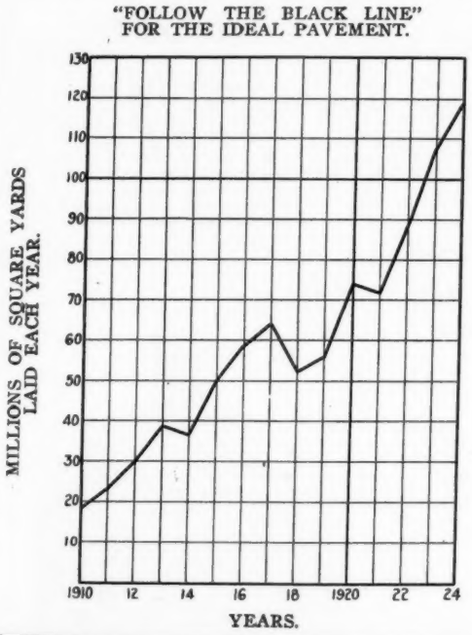
THE DOW CHEMICAL COMPANY
141 Water St., Midland, Mich.
Branch Sales Offices:
90 West Street, New York City
Second and Madison Streets, Saint Louis

KEEP ROADS UP AND TAXES DOWN WITH
DOWFLAKE
CALCIUM CHLORIDE

ASPHALT PAVED AMERICA

Nearly Nine Hundred Million Square Yards Have Been Laid on the Roads and Streets of America in Last Fifteen Years

1924, With Approximately 118,800,000 Square Yards, Breaks All Records



East and West the asphalt pavement is leading the way to auto comfort. On the Pacific Coast 72% of paving contracts let during 1924 were for asphalt, while on the Atlantic Coast, Massachusetts reports 68.6% asphalt on 1924 state road contracts.

ASPHALT—

Proved Through the Ages

WRITE FOR COMPLETE INFORMATION

THE ASPHALT ASSOCIATION

25 West Forty-third Street, New York City

Albany, N. Y. Charlotte, N. C. Chicago, Ill. Kansas City, Mo.

Let a Steel Shank Have the Strain

SKELTON "BULL DOG" SHOVELS

The One-Piece Solid Shank Skelton Bull Dog Shovels stand up under hard usage. Gravel, loose stones, hard clay or frozen earth are all alike to a Skelton. A special hard-surfacing finish protects the heat-treated blade.

Forged and rolled from one solid bar of High Carbon *Steel made for Shovels,* Skeltons have no welded or riveted joints to crack.

Straight handles fit into straight, deep sockets. Compare this with bent wood handles held by two small straps.

Where the strain is greatest, Skeltons are strongest. A good shovel is economy. A Skelton is lasting economy.

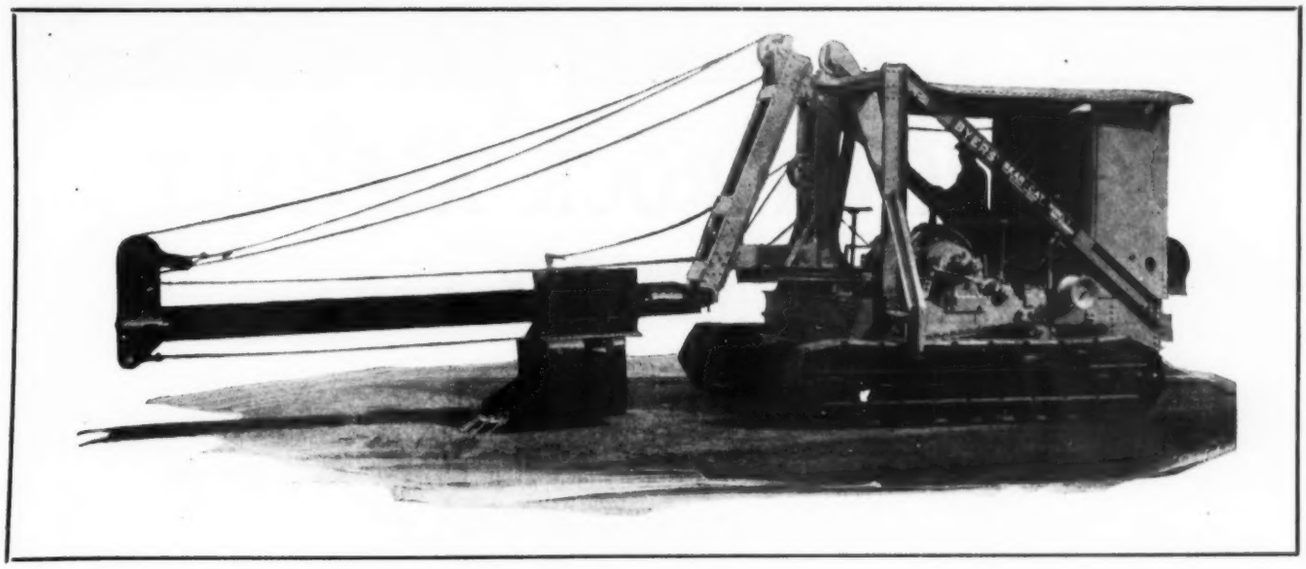
The "Bull Dog"

Blade, Shank and Socket are forged and rolled from one piece of steel. The closed straight socket protects the handle. Notice the extra heavy reinforced shank. Built for unusually hard service with contractors and builders.

SKELTON SHOVEL CO., Inc.

DUNKIRK, N. Y.

NEW YORK OFFICE, 29 MURRAY STREET



The Bear Cat with clamshell boom and bucket is a fast material handler and a good digger.

For rapid travel it can mount a trailer on its own power and be hauled by motor truck. If full caterpillars are not needed we can furnish Byers "Truckrane," unmounted, for mounting on a motor truck chassis.

For Digging and Handling— Byers Bear Cat

Here is the all-around light crane that you have needed—fast, economical, easy to buy and easy to operate.

With skimmer attachment pictured above, it digs and loads at a speed that will surprise you, and with clamshell boom and bucket it is, we believe, the fastest crane on the market today.

This skimmer has a tremendous digging power, with a 12-ft. cutting stroke, and a two-part digging line. The ½-yard bucket is of the bottom dump type, and is tripped from the cab, no ground man being necessary.

The Bear Cat has made such a wonderful success everywhere with the clamshell, skimmer and other attachments, its power and stamina are unquestioned. Mounted on full caterpillars, it has all the traction and mobility of the famous war tanks.

The Bear Cat is a one-man operated machine. Consider the saving that means in operating expense. Its maintenance cost is extremely low, too, and you will be surprised at the low first cost of this high grade machine.

See it at the Road Show, or write us for particulars.

THE BYERS MACHINE COMPANY
190 Sycamore Street **Ravenna, Ohio**

Builders also of Truckrane; Full Circle Crane 10 Tons; Buckets; Hoists.

Representatives in 25 Cities

BYERS CRANES
THE "BEAR CAT"

UNIFORMITY **DURABILITY** **ECONOMY**

The CROWN ROCK ASPHALT COMPANY

Announces

The Completion of Its New Plant at Big Clifty, Ky., for the manufacture of

PREPARED ROCK ASPHALT

A Superior Road Surfacing Material

PREPARED ROCK ASPHALT is the superior product obtained by "curing" and "blending" the straight run natural rock asphalt with the proper amount of Fluxed Trinidad Asphalt. The curing, and the addition of superior asphaltic oils, and the thorough mixing of the product throughout the entire treating process results in a product of absolute uniformity, much greater strength, resistance, and endurance than standard unprepared rock asphalts.

SOLD UNDER A REAL GUARANTEE—"Crown Rock" is sold under a guarantee based on PHYSICAL TESTS, not merely tests for bituminous content. While the test for the amount of bitumen is probably one indication of a proper product, it is no guarantee that materials meeting this test only are satisfactory. "Crown Rock" not only meets this test, but is prepared to meet PHYSICAL TESTS that are the TRUE INDICATION OF A PROPER PRODUCT.

BEST BY TEST—We have gone to a great deal of expense in equipping our laboratory with machines especially designed for the purpose of subjecting our product to PENETRATION and COMPRESSION TESTS. Comparative tests of our product, which we will be glad to make, with natural rock asphalt, will show the superiority of Crown Rock in every respect.

UNIFORMITY AND DURABILITY — "Crown Rock" is a product chemically controlled, thereby eliminating the undesirable variation existing in unprepared rock asphalts as marketed today. All of our product is subjected to physical tests at our plant before being shipped, thus avoiding the possibility of the purchaser receiving any inferior material. "Crown Rock" has all the advantages found in natural rock asphalt such as exceptional endurance, cold application, ability to heal—and COSTS NO MORE.

Before specifying new road material, or placing orders, let us furnish you with our specifications prices and technical assistance.

THE CROWN ROCK ASPHALT COMPANY

911 NEAVE BUILDING **CINCINNATI, OHIO**

Mines and Treating Plant: Big Clifty, Ky.

See Us At the Road Show

Booths 33, 34, 44, 45, Ball Room

VIBROLITHIC is not a material. *It is a mechanical process.* Vibrating machines, transmitting 1,500 impulses per minute, impress a coating of hard rock, cubical shaped with flat faces uppermost, into plastic concrete, *right at the plane of wear.* These rock particles displace entrapped air and excess water without increasing volume, resulting in thorough compaction of the concrete—*all in the same operation.*

While at the Road Show, let us explain the Vibrolithic Method. See this perfected concrete pavement on Sheridan Road in Lincoln Park—as good as new after carrying 40,000 vehicles daily for a year.

83 Cities

Used our Vibrolithic Method of perfecting concrete pavement during 1924, in 16 states, as follows:

Arkansas	**Mississippi**
Colorado	**Missouri**
Illinois	**Nebraska**
Indiana	**New Jersey**
Iowa	**South Dakota**
Kansas	**Oklahoma**
Michigan	**Washington**
Minnesota	**Wisconsin**

Portland Cement Concrete Pavement

"Armorplated" by

THE *Vibrolithic* METHOD

Vibrolithic superiority is recognized in its acceptance on road and street projects in sixteen states and eighty-three cities. Reorders have come from practically every town where Vibrolithic has been used.

The Vibrolithic Method produces extreme density of concrete (high volume of coarse aggregate and less mortar and higher beam strength of slab, consequently greater resistance to contraction, expansion and impact, reducing cracking and surface wear.

Vibrolithic does not introduce new materials, delay the work or make costly demands on the contractor.

Write for our moving picture Booklet D, showing progressive steps in The Vibrolithic Method.

Vibrolithic Concrete Pavement on Sheridan Road, Lincoln Park, Chicago.

American Vibrolithic Corporation

INSURANCE EXCHANGE BUILDING DES MOINES, IOWA

SALES OFFICES IN 16 OTHER CITIES

(A. B.)

WOOD TRASH and SEWAGE PUMP

(New Orleans) (Patented)

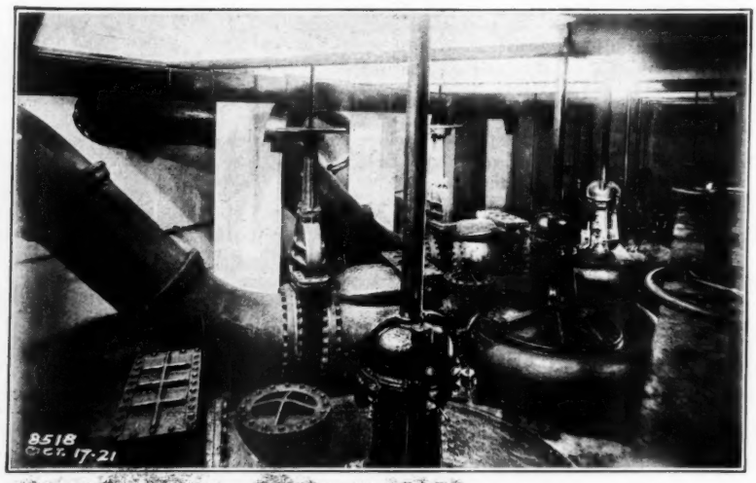
For

Lifting Unscreened Sewage

Send for Catalog 28-A

(Larger edition to follow)

The saving effected by these pumps in the cost of screening makes them cheapest in the long run.



WOOD PUMPS AT EVANSTON, ILL.

The record of service of this wonderful pump for six years is available and once you use it, you will take no other.

Address

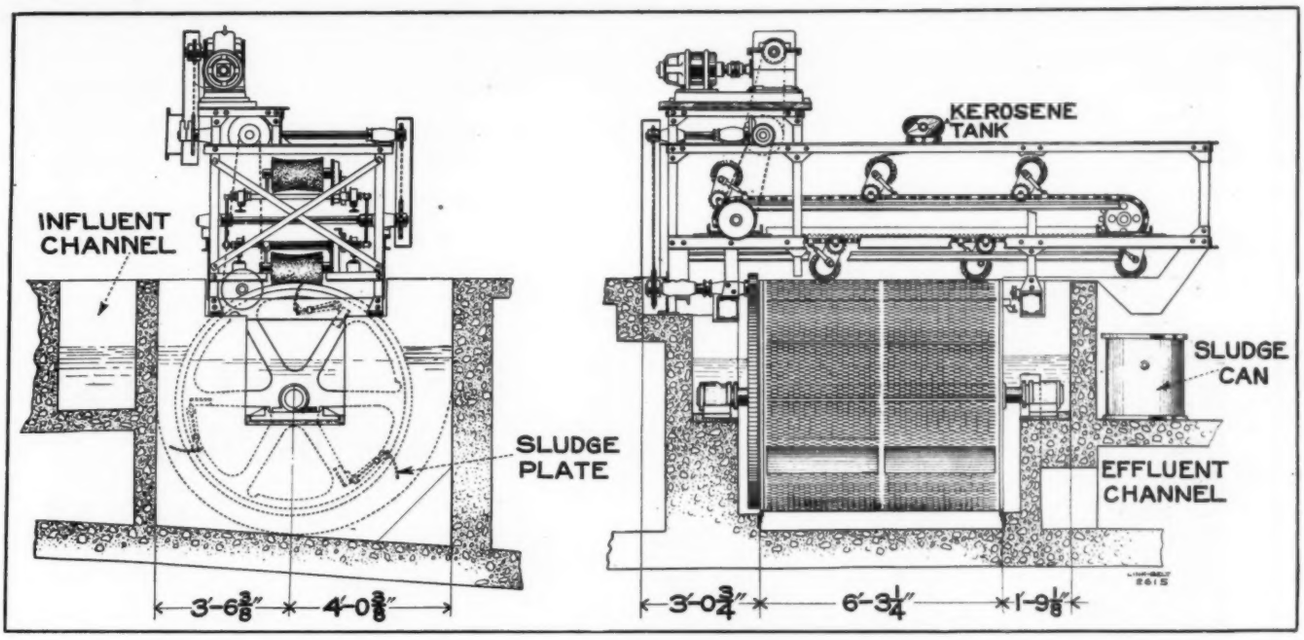
Pacific Flush-Tank Company

4241 Ravenswood Avenue
Chicago, Ills.

or

Singer Building
New York

We do not design Pumping Stations, only the Equipment



Making the most of a limited space with the Tark Sewage Screen

COMPACTNESS is an essential feature when designing a sewage treatment plant for use where soil conditions are bad, and where a system of trunk sewers comes in at low level.

The plant designed for the borough of Keansburgh, New Jersey, by Mr. Alexander Potter, Consulting Engineer, may well be called a model of compactness.

The pumping and screening plant is placed near the geographical center of the borough. Since practically the entire borough lies but a few feet above tidewater, the soil is saturated, requiring the pumping of the entire system.

One Tark sewage screen, six feet in diameter by six feet long, and three 875 G.P.M. pumps, are installed in a caisson twenty-two feet in diameter. Yet there is no noticeable crowding of machinery, and every part is easily accessible to the operator.

You will find the same type of screen—the TARK—in use at the Milwaukee sewage disposal plant, proving that the TARK SCREEN is suitable for large installations as well as small. Write for Book 542.

1942

LINK-BELT PRODUCTS

- Elevators and Conveyors for all materials
- Locomotive Cranes
- Crawler Cranes
- Portable Loaders Belt and Bucket types
- Belt Conveyors
- Water Intake Screens
- Car Loaders and Unloaders
- Coal and Ashes Handling machinery
- Silent Chain Drives
- Chains, Wheels, Buckets
- Gears, Transmission machinery

Send for Catalogs

LINK-BELT COMPANY

PHILADELPHIA, 2045 Hunting Park Ave. CHICAGO, 300 W. Pershing Road INDIANAPOLIS, P. O. Box 346

New York - - - - 2676 Woolworth Bldg. Buffalo - - - - - - 745 Ellicott Square Detroit - - - - - 4222 Woodward Ave. Louisville, Ky. - - - - 321 Starks Bldg.
Boston - - - - - - - 49 Federal St. Wilkes-Barre 826 Second Nat'l Bank Bldg. Kansas City, Mo., R. 405, 1002 Baltimore Ave. New Orleans - - - - 604 Carondelet Bldg.
Pittsburgh - - - - - - 335 Fifth Ave. Huntington, W. Va. Robson-Prichard Bldg. Denver - - - - - - 520 Boston Bldg. Birmingham, Ala. - 730 Brown-Marx Bldg
St. Louis - - - - - - - 705 Olive Street Cleveland - - - - 329 Rockefeller Bldg. Atlanta - - - - - - 24 Marietta St. Link-Belt Limited - Toronto and Montreal

H. W. CALDWELL & SON CO.:—Chicago, 1700 S. Western Ave.; New York, 2676 Woolworth Bldg.; Dallas, Texas, 810 Main St.

LINK-BELT MEESE & GOTTFRIED CO.:—San Francisco, 19th and Harrison Sts.; Los Angeles, 400 E. Third St.; Seattle, 820 First Ave., S.; Portland, Ore., 67 Front St.

LINK-BELT

12-Ton Type "E" Crawling Tread—40 ft. boom—¾-yd. bucket.

The Answer to Low Cost Material Handling. The solving of loading and unloading problems becomes simple when

O. S.

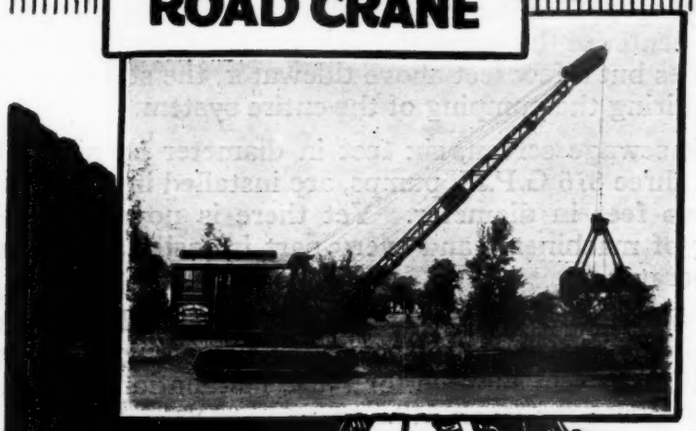
Dependable Cranes are installed

The Low Cost of Maintenance and Repair have well earned the title of Dependable.

Orton & Steinbrenner Co.
OFFICES:
608 SO. DEARBORN STREET
CHICAGO, ILLINOIS
Shops: Huntington, Indiana

LITTLE GIANT ROAD CRANE

for Speedy Work and Steady Duty



If you want top-notch efficiency in highway work, you can get it with the Little Giant Road Crane for back-filling, trenching and moving bulk materials of all kinds.

Compact in design, sturdy in construction and abundant in power, the Little Giant goes anywhere, handles anything and pleases everybody.

2-Wheel Drive 4-Wheel Drive Full Crawler Tread
Gasoline Steam Electric

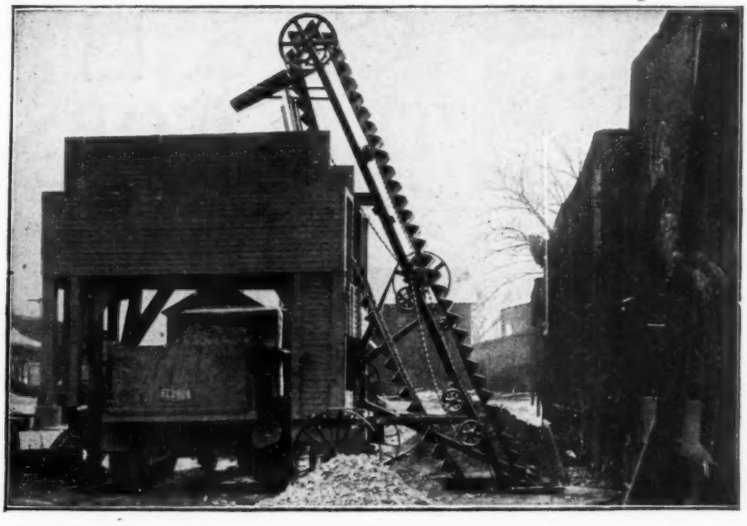
Write us for full information—no obligation

TRADE THE LOCOMOTIVE CRANE CO. OF AMERICA CHAMPAIGN, ILL. MARK

The Locomotive Crane Company

OF AMERICA
CHAMPAIGN · ILLINOIS

If You Are Interested in Reducing Labor Costs



IT WILL PAY YOU TO INVESTIGATE THE

RELIANCE PORTABLE CAR UNLOADER

THIS UNIT WILL HANDLE

25 TO 35 TONS

of Crushed Stone or Sand and Gravel an Hour and Requires but One Man to Operate.

We also manufacture and offer a complete line of Road Building, Quarry and Gravel Handling Equipment, including Crushers, Elevators, Screens, Bins, etc.

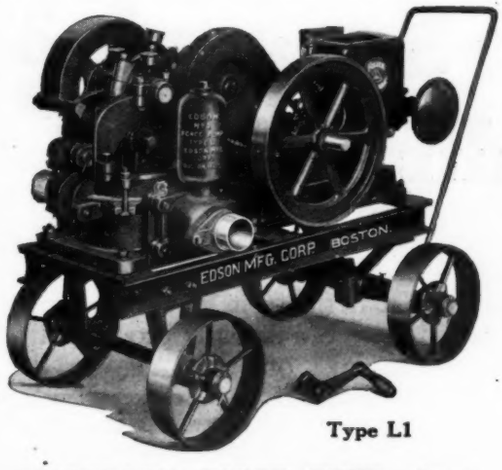
LET US SHOW YOU HOW RELIANCE EQUIPMENT WILL SAVE YOU MONEY.

Send for Catalogue and Prices.

UNIVERSAL ROAD MACHINERY CO.

KINGSTON, N. Y.

141 MILK STREET, BOSTON, MASS. **114 LIBERTY STREET, NEW YORK CITY**



Type L1

DIAPHRAGM FORCE PUMP — Latest Design. A *Compact* Unit—*Efficient*—*Durable.* Easy to replace Diaphragm without disassembling Jack from Pump Head.

EDSON

Reg. U. S. Pat. Off.

DIAPHRAGM PUMPS

FOR

HEAVY DUTY and LONG SERVICE

FIRST IN 1859
FOREMOST TODAY

Write for CATALOGUE T, descriptive of our Revised and New Designs of

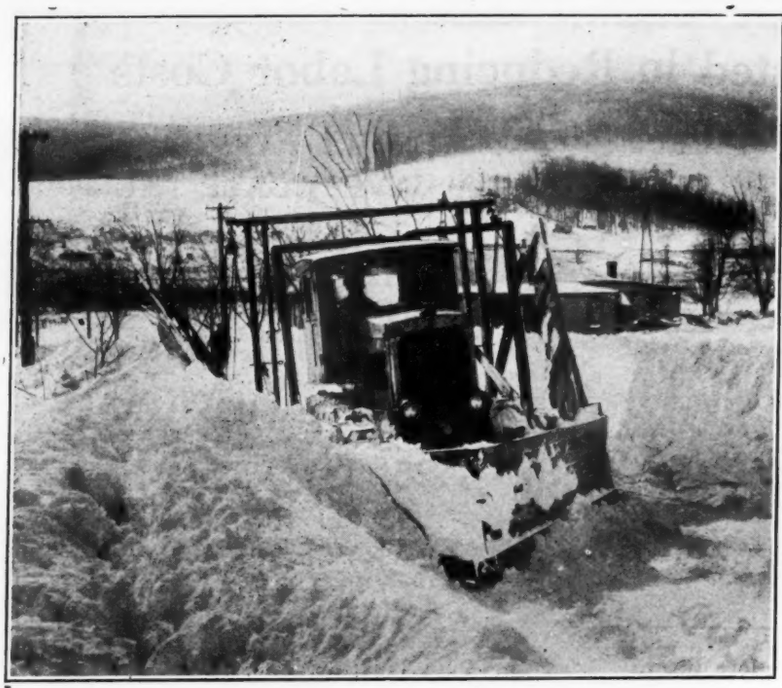
EDSON QUALITY PUMPS
GUARANTEED DIAPHRAGMS
SPECIAL SUCTION HOSE
PUMP ACCESSORIES

EDSON MANUFACTURING CORP.

Main Office and Works
375 BROADWAY, BOSTON, MASS.

NEW YORK, 7 WATER STREET

Established 1859
AGENCIES IN PRINCIPAL CITIES



J. T. TRACTORS handling Sargent Snow Plows in Schenectady County, New York.

J. T TRACTORS

will help keep your roads open during the winter as well as in summer

Don't wait till the heavy snows block traffic and interfere with the commerce of your city.

City, Township and County officials —the men who are responsible for the conditions of the roads—will be interested in the economy and dependability of J. T. Tractors for pushing snow plows in winter as well as grading unpaved streets, plowing, pulling excavating machines and a thousand other jobs that will keep it busy the year round.

Let us tell you some of the advantages which prompted the officials of Schenectady County to purchase these tractors.

***The* J. T. Tractor Company**

Ohio Corporation

17900 St. Clair Avenue **Cleveland, Ohio**

Russell Portable Screening Crushing *and* Loading Plant!

One handling of material performs all three operations—screening, crushing and loading. Conveys the material from gravel pit, screens, crushes and delivers a uniform product directly into wagon, truck or bin.

The feed back principle to crusher makes all material uniform—no oversize can pass the screen. Hopper arrangement and wide 24 inch delivery conveyor affords rapid loading of trucks.

Construction of this outfit is most substantial and durable insuring steady service and long life. Weight complete 28,500 pounds.

The complete Russell Line includes—**8 Sizes Road Machines, 2 Sizes Elevating Graders, Maintenance Patrol Machines for both Motor and Horse Power, Scarifiers, Road Drags and Wheel Scrapers, Drag Lines, Gravel Screening, Crushing and Loading Equipment, Steel Beam Bridges, etc.**

See the Russell Exhibit

NATIONAL GOOD ROADS SHOW

At the Coliseum

JANUARY 5th TO 9th INCLUSIVE

CHICAGO, ILL.

A very complete 68 page catalog of special interest to all road builders—sent free and postpaid.

RUSSELL GRADER MANUFACTURING COMPANY

Factory and General Offices, MINNEAPOLIS, MINN.

Affiliated Plants—Cicero, Ill., North Kansas City, Mo., Memphis, Tenn., Dallas, Tex.

Representatives in all principal cities.

Good Management
A Good Operator
+ ERIE Shovel
Big Output

Week's Record, ERIE Shovel No 2965, John F. Casey Co., Pittsburgh

Excavating for University of Pittsburgh Stadium. Supt. for John F. Casey Co., Walter Walsh. Shovel Operator, Guy Storr.

Material stiff brown shale, loaded from a 4 ft. bank as shown by above photo, averaging about 1 1/10 cu. yds. per wagon. 10-hour shifts every day except August 25th, only 3 hours (rain).

		Wagons	
Aug. 25,	Monday	350	(Rain, only
Aug. 26,	Tuesday	1,030	3 hours work)
Aug. 27,	Wednesday	984	
Aug. 28,	Thursday	1,231	
Aug. 29,	Friday	1,021	
Aug. 30,	Saturday	1,327	

Total: 53 hours, 5,943 wagons. Estimated by Mr. Walsh at 6,600 cu. yds.

Maybe you'll never need to load 5943 wagons in a week—

Such spurts are seldom needed. Steady digging is what you want most.

But when you *do* have a bonus-and-penalty contract, and want to *get the excavation done,* there's extra profit in having an ERIE.

Think of digging 6,600 cu. yds. of stiff brown shale in fifty-three hours, with a ¾ cu. yd. shovel! (See the record at the right.) The *highest* day's run of another ¾ yd. shovel on the same job was 627 wagons in 10 hours.

The ERIE's extra speed comes from quick motions, instantly controlled. The ERIE's *reliability* has grown out of an experience in steam shovel building that has no equal. 3,200 ERIES in service. Constant improvement has perfected the design.

There is enough uncertainty on any contract, without adding an extra gamble. That's one big reason why you see so many contractors "playing safe" on power shovels, buying the reliable ERIE.

You need ERIES for hard steady digging

Reports like this are not unusual. They show the kind of service that practically every ERIE owner gets:

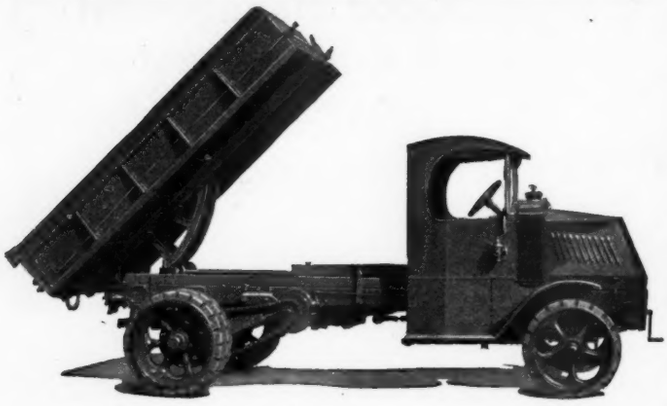
"Although we have done some very hard digging our upkeep has been comparatively small; have had 6 years' experience with different makes of shovels and am fully convinced that the ERIE is the only ¾ yard shovel on the market."—H. D. Ackerman, Sec-Treas., Arter Construction Co., Ft. Wayne, Ind.

ERIE STEAM SHOVEL CO., Erie, Pa., U. S. A.

Incorporated 1893. Builders of ERIE Shovels, Cranes, Ditchers, Draglines, Steam Hoes, etc.
Branch Offices: Boston, New York, Philadelphia, Pittsburgh, Atlanta, Chicago
Representatives throughout the U. S. A.

ERIE

RIVETING
is one of the many uses for the "SCHRAMM" Fordson Compressor-Tractor. This self-propelled compressor outfit delivers 100 cubic feet of air per minute. The compressor is larger than used on other outfits rated as being the same size and yet, complete with tractor, costs no more than the ordinary portable compressor.
WRITE FOR FREE DEMONSTRATION OFFER
SCHRAMM, Inc.
WEST CHESTER, PA.
54 Dey St., New York
549 W. Washington St., Chicago
331 Fourth Ave., Pittsburgh
709 Arch St., Philadelphia
"SCHRAMM" Compressor-Tractor
S-378



Wood-dumped Loads Build good roads

Whether a road is to be concrete, gravel, macadam or asphalt — dump trucks play a big part in its construction.

Trucks equipped with Wood Hydraulic Hoists and Steel Dump Bodies make better roads because they are designed and constructed to give the maximum service with minimum upkeep.

WOOD UNDERBODY

Hydraulic Hoists

The location of this type of hoist under the body allows longer bodies and bigger loads without overhang; while simplicity in the construction of the hoist practically eliminates break downs, cuts delays, and speeds up construction.

For quicker jobs and larger profits, write for our Hoist and Body Catalog.

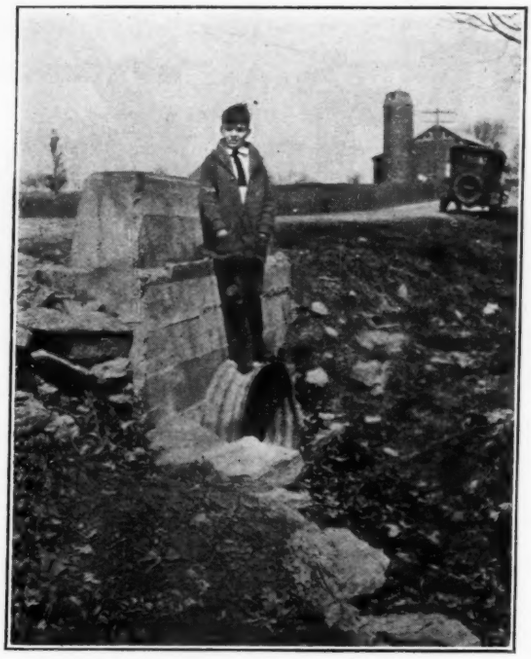
Our exhibit at the Chicago Good Roads Show, January 6th to 9th, will be the most complete and comprehensive we have ever made. You are cordially invited to meet us there.

SPACES A-1-2-3

Wood Hydraulic Hoist & Body Co.

World's Largest Makers of Hydraulic Hoists and Steel Bodies

7934 Riopelle Street Detroit, Michigan



A G. O. H. I. CULVERT

On Kentucky State Highway

After all has been said on the importance of proper sub-grades, and all other factors of construction bearing upon the wearing qualities of this, that, or the other Road Surfacing material have been discussed, the evidence shows that Drainage is the most vital consideration. This applies to all types of Road Surfacing.

Perfect Drainage is secured by the installation of "Genuine Open Hearth Iron" Culverts for all conditions. Their Span of Life is far greater than that of any other road building material yet discovered.

We are the exclusive manufacturers of Culverts made of this remarkable iron and solicit your inquiries.

Newport Culvert Co., Inc.

NEWPORT, KENTUCKY

"Domestic" Compressor Operating Paving Breakers, Chicago, Ill.

"DOMESTIC"
Reg. U. S. Pat. Off.

PORTABLE AIR COMPRESSORS

IDEAL OUTFITS FOR CONTRACTORS, PUBLIC SERVICE CORPORATIONS, STEEL ERECTORS, ETC.

Furnished mounted on steel truck, rubber tired trailer or ready to mount on truck chassis.

Nothing superior for operating rock drills, riveting guns, paving breakers, pneumatic spades, etc.

"Domestic" Air Compressors manufactured in sizes of 50, 62, 92 and 184 cu. ft. displacement of free air per minute.

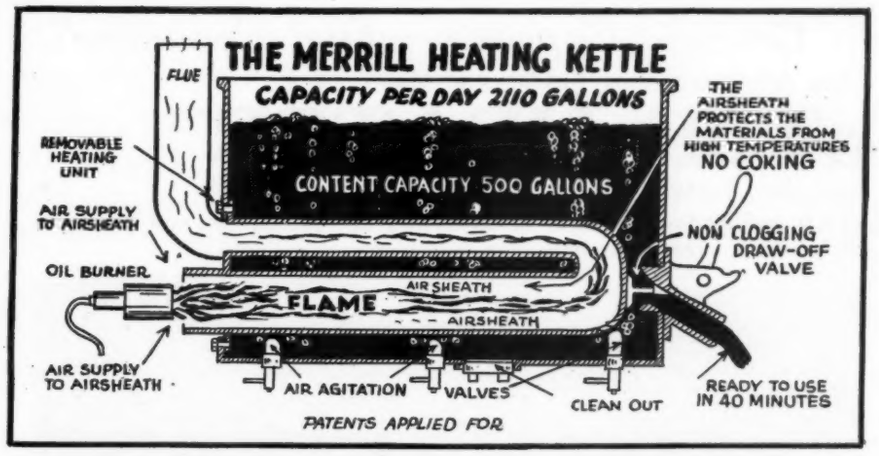
Send for copy of Bulletin "AK."

Visit our Exhibit—Good Roads Show—Chicago, Jan. 5-9, Booths E 16-17

DOMESTIC ENGINE & PUMP CO., Manufacturers
SHIPPENSBURG, PA.

A 184 cu. ft. DOMESTIC Air Compressor mounted on rubber tired trailer.

PUMPS AIR COMPRESSORS HOISTS



The Merrill 500-Gallon Kettle

Guaranteed Output Per Day

40 Drums

Operating Cost Per Day Less Than

$3.50

KETTLE TROUBLES eliminated forever

THE ABOVE DRAWING ILLUSTRATES THE NEW PRINCIPLE OF AIRSHEATH DIRECT HEATING WHICH PRESENTS TO THE MATERIAL A HEATING SURFACE OF UNIFORM TEMPERATURE.

THE COMBINATION OF AIRSHEATH AND AIR AGITATION DOES AWAY WITH ALL COKING, OVERHEATING, BURNT-OUT BOTTOMS AND CARBONIZING.

ASK US ABOUT OUR PORTABLE "PATCHER" UNIT!!

Manufactured by

CHASE & LYMAN, Inc., BOSTON, MASS.
12 PEARL STREET

Our more than thirty years' experience enables us to select materials and design equipment which will render the best service. The number of Buffalo-Springfield Rollers now in use is not equalled by that of any other make of roller produced in America or abroad.
Manufactured in all types and sizes, steam and motor. Get full particulars regarding them.
The Buffalo-Springfield Roller Co.
Springfield, Ohio
BUFFALO-SPRINGFIELD ROLLERS

"Quicker Action—Greater Capacity—Fuel Economy"

Are All Outstanding Features of the

"HoTsTuF HEATER"

"A GOOD NEW YEAR RESOLUTION"

Purchase a "HOTSTUF" HEATER and Reduce the cost of operation in your Street and Highway Departments.

The 50-Gallon PATROL Heater is especially adapted for maintenance work and has a melting capacity of approximately 5,600 lbs. of asphalt in 8 hours; fuel consumption approximately 1 gallon per hour. The 100-Gallon heater is best adapted for new construction work, having a melting capacity of approximately 8,000 lbs. of asphalt in 8 hours; fuel consumption approximately 1½ gallons per hour.

Compare the above figures with your old style equipment—and you will find the "HOTSTUF HEATER" has about DOUBLE the EFFICIENCY.

Quicker Action — Larger Capacity — Durability and Economy in operation are fundamentals built in the "HOTSTUF HEATER."

An unconditional "FREE TRIAL" will prove these essential features.

Write now for further data and prices.

Mohawk Asphalt Heater Co., Scotia, N. Y.

No. 69 Maintenance

HEATING EFFICIENCY

Heating Efficiency is an outstanding feature of Littleford Tar and Asphalt Heaters—In the shortest possible time after the fire is started, hot materials are ready to draw—no idle labor at high wages waiting for slow acting kettles.

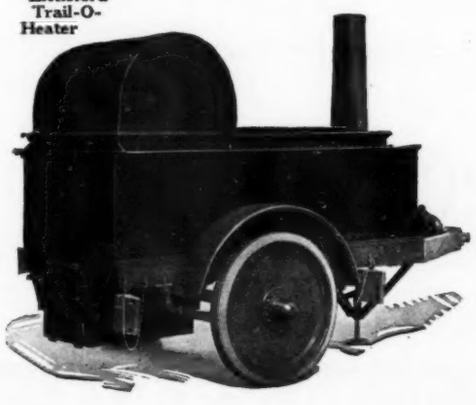
Contractors and Maintenance officials tell us that Littleford Tar and Asphalt Heaters, melt and heat in one-third the time required with ordinary heaters. This is due to their scientific design and superior construction.

Heaters for every requirement of Road Construction and Maintenance. Send for catalogue.

LITTLEFORD BROS.

451 East Pearl Street Cincinnati, Ohio

The Littleford Trail-O-Heater



Make every shot SURE!

You get sure-fire results with du Pont blasting accessories.

Many users of du Pont explosives have learned from experience that it pays in dollars and cents to use superior accessories in EVERY blasting job. Your investment in explosives and labor is too great to jeopardize with any but the best accessories, particularly since their cost is comparatively small.

With du Pont explosives use ONLY accessories bearing the du Pont Oval. Then you'll get the results you're after.

Back of du Pont explosives and accessories is 122 years of manufacturing experience—your assurance of highest quality.

Blasting Caps
Delay Electric Blasting Caps
Blasting Caps
Blasting Machines
Galvanometers
Leading Wire
Electric Blasting Caps
Fuse
Delay Electric Igniters
Rheostats
Cap Crimpers
Tamping Bags

Write for Blasting Accessories Catalog containing descriptions and illustrations of du Pont accessories and practical information about their use.

E. I. du Pont de Nemours & Co., Inc.

Explosives Department

Wilmington, Delaware

BRANCH OFFICES:

Birmingham	Ala.	Mexico City	Mex.
Boston	Mass.	Miami	Fla.
Buffalo	N. Y.	New York	N. Y.
Chicago	Ill.	Pittsburgh	Pa.
Denver	Colo.	Portland	Ore.
Duluth	Minn.	St. Louis	Mo.
El Paso	Tex.	San Francisco	Cal.
Huntington	W. Va.	Scranton	Pa.
Joplin	Mo.	Seattle	Wash.
Kansas City	Mo.	Spokane	Wash.
Springfield	Ill.		

Du Pont Products Exhibit
Atlantic City, N. J.

DU PONT EXPLOSIVES

POPULAR

Movie stars became popular because of their ability to please others. Likewise Monarch Industrial Tractors have earned their present popularity through their ability to please their owners.

Write for Literature Descriptive of Our Line

THREE MODELS
"C" 30-20, "E" 4-40, "D" 6-60

MONARCH TRACTORS, Incorporated
WATERTOWN, WIS., U. S. A.

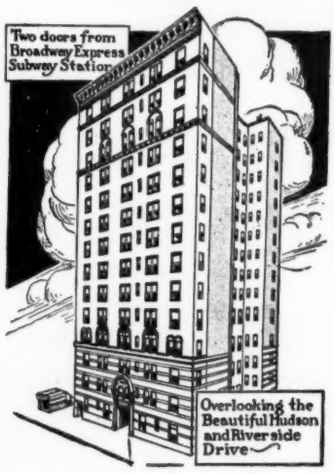
Builders of the Crawler without track trouble.

Monarch INDUSTRIAL TRACTORS
THE MOST DEPENDABLE CRAWLER

HOTEL ALEXANDRIA

250 West 103rd St. New York City
Between Central Park and Hudson River

SINGLE ROOM WITH PRIVATE BATH
$3.00 AND UP
DOUBLE ROOM WITH PRIVATE BATH
$4.00 AND UP
Other suites in proportion. Also a few desirable unfurnished apartments on yearly lease.



Without question the coolest location in the city.

Subway express station at door, elevated two blocks away.

Special attention given to ladies traveling alone.

Exceptional Restaurant at very moderate prices.

S. L. ROOT, Manager

Chicago's Newest Hotel

Pershing Hotel

Cottage Grove Ave., at 64th Street, CHICAGO

Particularly the place to stop if your business is on Chicago's South Side, or in the "Loop." Only a few minutes from 63rd Street station of Illinois Central, Michigan Central and Big Four, and Englewood station of New York Central, Rock Island, Pennsylvania and other railroads. Near to everywhere in Chicago via elevated trains, surface cars, boulevard motor coaches, suburban trains. The city's largest restaurant is in the Pershing.

Exquisitely furnished room with private bath, $2.50 to $5 a day for one person, $3.50 to $6 for two.

Operated by Rice Hotel Corporation
H. E. RICE, President

When You Write Advertisers

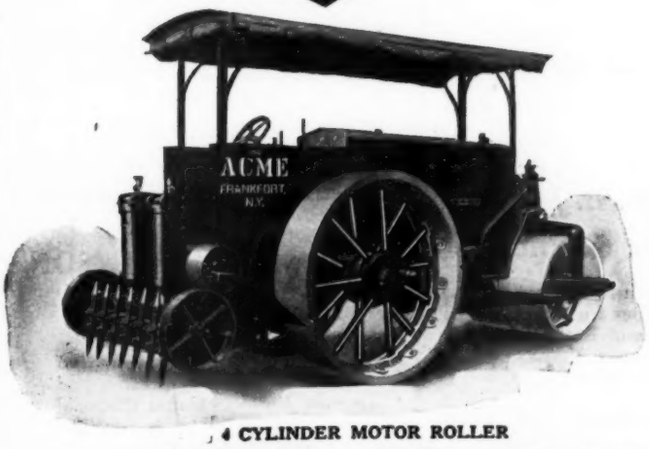
You Will Do Them and Us a

Favor by Mentioning

PUBLIC WORKS

ACME

Road Equipment for every Requirement



4 CYLINDER MOTOR ROLLER

We manufacture: Four-Cylinder Motor Road Rollers; Steam Road Rollers; Solid Cast Steel Frame Rock Crushers—Portable and Stationary; Elevators, Screens, Portable Storage Bins; Complete line Tom Thumb Graders; Portable Gravel Screening and Unloading Plants; Wagons, etc.

Write for New Catalogue

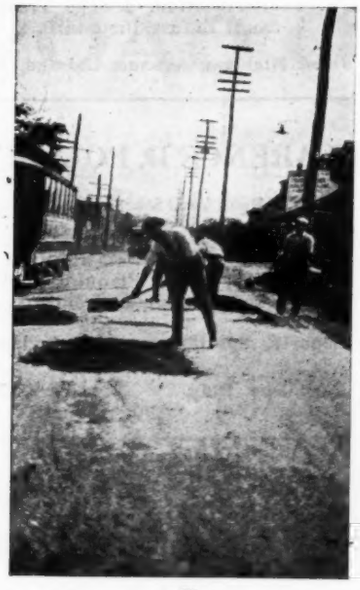
ACME ROAD MACHINERY CO.

NEW YORK OFFICE: 120 Liberty Street
EXPORT OFFICE: 120 Liberty St., N. Y. City
BOSTON OFFICE: 141 Milk St., Boston, Mass.

Frankfort, N. Y.

Provident Bank Bldg., CINCINNATI, O.
Equitable Building, BALTIMORE, MD.
127 North Dearborn Street, CHICAGO, ILL.

COLD PATCH



(1)
Repairing Bituminous Concrete

(2)
Same, two months later, showing repairs after being consolidated by travel

HEADLEY No. 1

AN ASPHALTUM EMULSION

For repairs and resurfacing.

No expensive heating plant required.

Can be used in wet or dry weather.

No time lost account wet materials.

Write for descriptive booklets.

ASPHALT AND ROAD OIL

HEADLEY GOOD ROADS CO. FRANKLIN TRUST BUILDING PHILADELPHIA, PA.

DIRECTORY OF CONSULTING ENGINEERS

ENGAGED IN MUNICIPAL AND PUBLIC WORK

ALVORD, BURDICK & HOWSON

John W. Alvord
Charles B. Burdick Louis R. Howson

Engineers

for

Water Works, Water Purification, Flood Relief, Sewerage, Sewage Disposal, Drainage, Appraisals, Power Generation.

Hartford Bldg. Chicago

THE AMERICAN APPRAISAL CO.

Milwaukee New York

Authoritative Reports and Valuations covering Public Utility, Municipal, Mineral, Industrial, Commercial and Residence properties.

BLACK & VEATCH

Consulting Engineers

Inter-State Bldg., Kansas City, Mo.

Sewerage, Sewage Disposal, Water Supply, Water Purification, Electric Lighting, Power Plants, Valuations, Special Investigations, Reports.

E. B. Black N. T. Veatch, Jr.

BROSSMAN, CHAS.

Consulting Engineer

Merchants' Bank Building
Indianapolis, Ind.

Water Supply. Sewerage and Disposal. Lighting Plants—Supervision of Construction and Operation. Appraisals—Expert Testimony.

BURNS & McDONNELL ENGINEERING CO.

McDonnell-Smith-Baldwin-Lambert

Consulting Engineers

Waterworks, Sewerage,
Lighting, Appraisals,
Rate Investigations

Kansas City, Mo. Interstate Bldg.
Los Angeles, Cal. Marsh-Strong Bldg.

CAIRD, JAMES M.

Assoc. Am. Soc. C. E.

Chemist and Bacteriologist

Office and Laboratory:

92 Fourth Street, Troy, N. Y.

Water Analysis and Tests of Filter Plants

DAVIS, B. H.

Consulting Engineer

Monumental Reinforced Concrete Bridges of All Types for Parks, Cities, Counties, States and Railroads. Consultations, Estimates, Plans, Specifications and Supervision.

Whitehall Building, New York

DOW & SMITH

Chemical Engineers

Consulting Paving Engineers

A. W. Dow, Ph.B. F. P. Smith, Ph.B.
Mem. Am. Inst. Ch. Engrs.
Mem. Am. Soc. Civ. Engrs.

Asphalt, Bitumens, Paving, Hydraulic Cement, Engineering Materials.

131-3 East 23rd St., New York

New York City 116 W. 39th St.

A. E. HANSEN

Hydraulic and Sanitary Engineer

Design and Supervision of Construction

Sewerage Water Works
Sewage Disposal Water Purification
Drainage Water Works Valuation
Garbage Disposal Water Analysis

HAZEN & WHIPPLE

Hydraulic and Sanitary Engineers, Water Supply, Sewerage, Drainage, Valuations, Plans, Supervisions of Construction and Operation.

ALLEN HAZEN G. C. WHIPPLE
C. M. EVERETT L. N. BABBITT
MALCOM PIRNIE

25 W. 43rd St., New York City

NICHOLAS S. HILL, JR.

Consulting Engineer

Water Supply Sewage Disposal
Hydraulic Developments

Reports, Investigation, Valuations, Rates, Design, Construction, Operation, Management, Chemical and Biological Laboratories

112 East 19th Street
New York City

GEORGE A. JOHNSON

Consulting Engineer

Water Supply and Purification
Sewerage and Sewage Disposal
Refuse Collection and Disposal

150 Nassau Street
New York

PEARSE, GREELEY & HANSEN

Hydraulic and Sanitary Engineers

Reports, Designs, Supervision, Appraisals, Water Supply, Sewerage, Water Purification, Sewage Treatment, Refuse Disposal.

6 No. Michigan Avenue, Chicago, Ill.

CLARENCE D. POLLOCK

Mem. Am. Soc. C. E.
Consulting Engineer

Pavements, Highways, Drainage, Sewerage, Town Planning and General Municipal Problems.

Reports, Specifications, Supervision.

Park Row Bldg. New York City

POTTER, ALEXANDER

50 Church St., New York City

Civil and Sanitary Engineer

Specialties: Water Supply, Sewerage and Pavements.

MOST REASONABLY PRICED MIXER IN AMERICA

Built in All Sizes and Types.

Get New Prices—Terms. Just off Press.

The American Cement Machine Co., Inc.

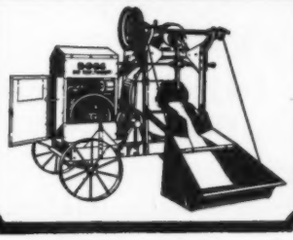
Branch Offices Everywhere

Keokuk Iowa

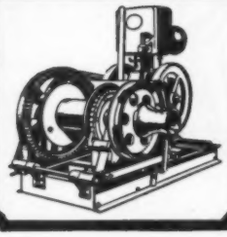
THE 300,000 H.P ELECTRIC CITY

Branch Offices in All Principal Cities

BOSS MIXERS ½ to 5 BAG SIZES



BOSS HOISTS - $125.00 UP



INDIAN ROAD OILS

There is a difference in Road Oils as in every other commodity. Indian Road Oils are made in the same great Refinery where Indian Gasoline, Havoline Oil and other famous petroleum products are produced.

Uniformity, the finest quality and service that delights the buyer are synonymous with this great independent oil organization.

We invite your inquiries

INDIAN REFINING CO.

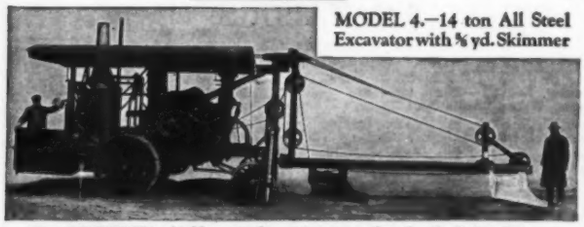
INCORPORATED

LAWRENCEVILLE, ILL.

STEAM KEYSTONE SHOVELS

TRADE MARK REGISTERED U. S. PATENT OFFICE

MODEL 4.—14 ton All Steel Excavator with ⅝ yd. Skimmer



The KEYSTONE is a highly versatile traction steam shovel with all the efficiency of specialized design, usable with three different interchangeable scoops—*Skimmer, Ditcher and Clam Shell*—for Road Grading, Trenching, Back-Filling, Cellar Digging, Pit Mining, Loading, Unloading and Handling Materials. Can be equipped with electric motor drive for use in buildings. Saves first cost, moving cost and upkeep and is readily sold or rented for any sort of excavation job. A reliable road shovel of remarkable adaptability to other uses.

The heavy Keystone Skimmer Bucket, ⅝ yd. capacity, has a horizontal crowd of 14 feet and fills itself at one shot in a six inch cut. It leaves a smooth surface, finished to grade and thus dispenses with costly hand-trimming. Shallow digging in hard material—old macadam, paving blocks, concrete and asphalt—is keystone work.

Made in two sizes: Model 3, 10 ton and Model 4, 14 ton. The good Keystone Digging Ideas in our catalogs and advertising sheets have made money for 1500 Contractors in the United States. Ask for them.

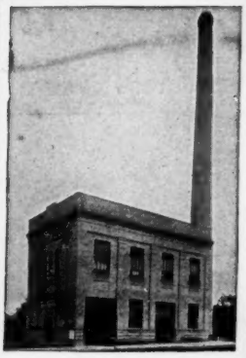
Model 4, with Boom extension and ½ yd. Clamshell Bucket.

Ditcher

Keystone stands on the solid. No cribbing needed, no danger from cave-in, of machine sliding into excavation. Any width or depth to 20 feet. There is 4 feet of water in this 12 foot ditch. The Keystone is adapted for hard going among roots, boulders, etc., and cleaning out blasted rock.

Keystone Driller Company, Beaver Falls, Pa.

170 Broadway, New York Monadnock Block, Chicago Joplin, Mo.



NEW ORLEANS LOUISIANA
36 TON PLANT

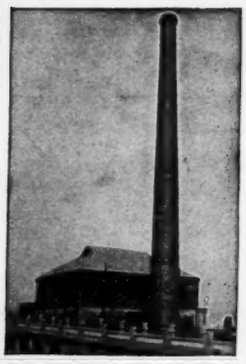
DECARIE INCINERATORS

for Municipalities and Institutions

We are one of the oldest concerns in the United States engaged in the erection of incinerators for the final disposal of municipal refuse.

Our plants are of a distinctive type, and of scientific design, passed upon years of experience. We have over 50 municipal installations in the United States and Canada. Among these are 15 repeat orders. Write us the conditions in your city and our engineers will furnish you with preliminary plans and proposals for the proper size of plant for your requirements.

Decarie Incinerator Corporation
342 Madison Ave. New York, N. Y.



RAVENSWOOD NEW YORK CITY
100 TON PLANT

JOINTITE

A SEWER PIPE JOINT COMPOUND

No caulking is necessary with JOINTITE. Alternate joints may be poured on the bank. Easily handled and placed. No skilled help required. Sets as soon as poured. Adheres to the pipe.

6 CATALOGS

on Airlock Apparatus for Sewers and Sewage Disposal

Catalog No. 22—Flush tank Siphons, Water Regulators.
Catalog No. 25—Automatic Siphons for Domestic Septic Tanks.
Catalog No. 21—Pneumatic Sewage Ejectors.
Catalog No. 12—Sewer Pipe Joint Compound.
Catalog Nos. 23 and 24—Automatic Siphons for Large Municipal Disposal Plants, etc.
Catalog No. 27—Imhoff Tanks.

Catalogs mailed on request.

PACIFIC FLUSH-TANK CO.

4241 Ravenswood Avenue, Chicago
Singer Building, New York

D&D

SAFETY and NOISELESS Manhole Cover

Does away with rattling or dishing

Our foundries and machine shops are equipped to handle work on a production scale. No order too large or small.

A large stock of stock patterns on hand and prompt deliveries assured. Special castings of soft gray iron from drawings or blueprints. We can also machine any castings to size.

Full particulars on request—send for catalogue.

WM. E. DEE COMPANY

30 N. La Salle Street Chicago, Ill.

Manhole, Catch Basin and Sewerage Castings of All Kinds. We Make Anything in Gray Iron
Write for Our Prices

Robinson Quick Service

Prompt Shipments of VITRIFIED SEWER PIPE

FLUE LINING ~ WALL COPING
FIRE BRICK ~ FIRE CLAY Etc.

12 PLANTS
110 CARS PER DAY

The Robinson Clay Product Co.
Akron, Ohio

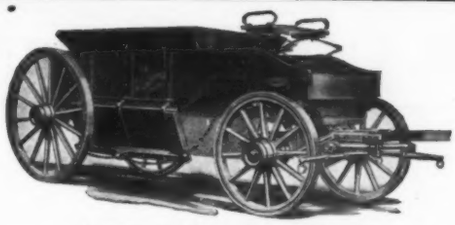
ASPHALT PLANTS

PORTABLE,
STATIONARY, RAILROAD,
SAND DRYERS

Either Direct Heat or Internal Flame

The

J. D. FARASEY MFG. CO.
CLEVELAND, OHIO



THE SUSQUEHANNA
Our New Model Patent Dumping Wagon

Four sizes: 1½—2—2½ and 3 yds. capacity. Has a continuous chain running under one door and an Equalizer in the rear, thence under the other door to the roller in front.

We attach the best brake on the market.

Also manufacturers of a full line of 2 wheel Dump Carts.

Columbia Wagon & Body Co., Columbia, Pa.

Completing the Road

Contractors who spread their road material with the celebrated

BURCH SPREADER

finish the job better, quicker and at half the expense of the same work by hand. Many of them declare this spreader pays for itself the first mile.

When used with the Burch Car Unloader, the labor cost saved alone on any job of a mile or more will more than repay the first cost.

These statements are well established by the experience of contractors. We will be pleased to send you copies of their letters and full particulars.

THE BURCH PLOW WORKS COMPANY
Dept. B-7 **CRESTLINE, OHIO**

REAR DUMP

WAGONS

For Refuse

COLLECTION

We shall be very glad to forward Bulletins on GARBAGE, REFUSE or ASH COLLECTION for the asking.

CONVERTIBLE WAGON-TRAILERS INC.
210-218 AMHERST ST. *BUFFALO, N.Y.*

The Book **on Construction Equipment**

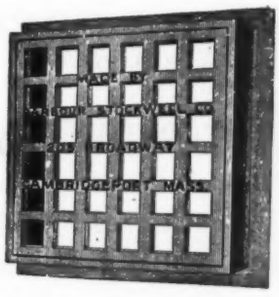
Here is a new book that helps the user of construction equipment to get the most out of every dollar he spends. It contains in convenient alphabetical arrangement, complete cost data on every kind of construction equipment.

HANDBOOK OF CONSTRUCTION EQUIPMENT
Its Cost and Use
By Richard T. Dana

849 pages, flexible, 351 illustrations, $6.00 net, postpaid.

The aim of the book is to assist the contractor and the engineer in the selection and application of the best methods in the least time. It eliminates guess and enables cost estimates to be made on the basis of definite knowledge.

Public Works **243 West 39th St. New York City**



Sewer Castings

100 Standard Styles

Special Analysis Iron

Catalogue furnished on request.

BARBOUR STOCKWELL CO.
CAMBRIDGE, MASS.

"TUFFIBRE"

REG. U. S. PATENT OFFICE

FOR ROTARY STREET SWEEPERS

"TUFFIBRE" is the toughest known fibre now in use in power or horse drawn street sweeping machines. It will outwear bamboo, rattan, bass, in fact, any fibre thus far used.

"TUFFIBRE" can be easily drawn into the cylinder without breakage or waste. The long life of this material will require less time for the machine to be laid up for refilling.

It is put up in 56 pound bundles, burlapped. Twenty-four or twenty-six inch lengths.

A great many municipalities are using this material and report excellent results. We would like the opportunity of adding your City to our increasing list of satisfied users.

Let us have your requirements and we will give you prompt service and guarantee entire satisfaction.

THE JOSEPHIE COMPANY

Importers and Dealers in FIBRES FOR ROTARY STREET SWEEPERS

Warehouse: 156-162 COIT STREET, IRVINGTON, N. J.
80 Maiden Lane, NEW YORK
Write for Prices

FITROS

DIFFUSER PLATES FOR
ACTIVATED SLUDGE

IN USE AT CHICAGO, HOUSTON
MILWAUKEE, INDIANAPOLIS
PASADENA, LODI, ETC., ETC.

GENERAL FILTRATION CO., Inc.
Cutler Building Rochester, N. Y.

Municipal Filtration

PURE CLEAN WATER
INSURED BY USING
NORWOOD EQUIPMENT

Write for Information

NORWOOD ENGINEERING CO.
FLORENCE MASS., U. S. A.

Venturi Meters

Measure hot and cold water, sewage, brine, chemical solutions, oil, gas, air and steam.

Bulletin on request

Builders Iron Foundry
Providence, R. I.

"WATCH DOG"

WATER METERS

Disc Current and Compound Types

GAMON METER COMPANY
280-294 South Street NEWARK, N. J.

The hotel that made Detroit famous for hospitality.

Hotel Fort Shelby

Detroit **Lafayette Blvd. at First St.**
Close to Detroit's busiest downtown corner.

Our pleasure in welcoming you as a Fort Shelby guest is joined with our purpose always to maintain the high standards of accommodation and service that distinguish this hotel. This is the *only* Detroit hotel with *Servidor* Service—protecting you from unnecessary intrusion of employes and from excessive tipping. Moderate charges throughout. Excellent restaurant and coffee shop. Convenient to rail and water terminals.

Rates per day $3 and up.

PLENTY OF WATER AT LOW COST
LAYNE WELL SYSTEM

More water produced from Layne Gravel Wall Wells.

Minimum power cost due to high efficiency pumps.

Water quantity guaranteed from every Layne System.

LAYNE & BOWLER COMPANY
Los Angeles, Cal. Memphis, Tenn. Houston, Tex.

BECAUSE

of its better protective qualities, Dixon's Silica-Graphite Paint makes frequent repainting unnecessary and so gives better protection at lower cost.

It is a natural combination of flake silica-graphite. The vehicle is best boiled linseed oil. It will not peel, crack or flake off because of the natural elasticity of flake graphite, while the silica is an anchor that withstands wear.

Write for Booklet No. 102-B

Joseph Dixon Crucible Co.
Jersey City, N. J.
Established 1827

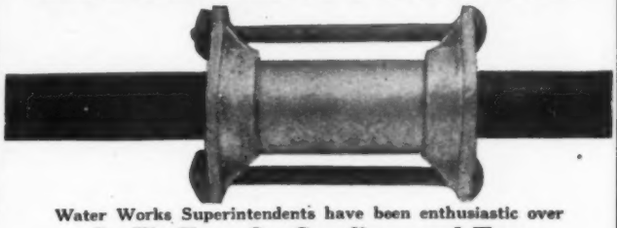
TYPE 30-C

Street Signs
Traffic Beacons
Durable—Legible
Economical

Detail and prices on request.

MUNICIPAL STREET SIGN CO., INC.
296 BROADWAY
NEW YORK, N. Y.

REPAIRS MADE EASY WITH
EASY-ON TEES and COUPLINGS



Water Works Superintendents have been enthusiastic over
Snell's Easy-On Couplings and Tees
ever since they were introduced in 1902.
Send for illustrated folder.
GEORGE H. SNELL, Attleboro, Mass.

Liquid EBG Chlorine

For Sewage Disinfection

Electro Bleaching Gas Co.
PIONEER MANUFACTURERS of LIQUID CHLORINE
Plant: NIAGARA FALLS, N.Y.

When You Buy

water meters, anything short of absolute accuracy, reliability and long service is inadequate. You will do well to investigate the

FEDERAL WATER METER

FEDERAL METER CO.
838-842 Fourth Ave. Brooklyn, N. Y.

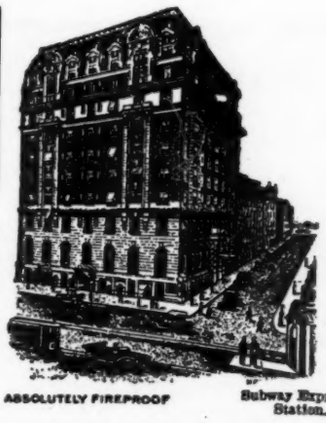
"COMFORT WITHOUT EXTRAVAGANCE"

HOTEL MARSEILLES

Broadway at 103d St.
(Subway Express Station at Door)
NEW YORK CITY

Near Riverside Drive, Central Park, Theatres and Shopping Sections

Single room, running water, $2.50
Single room and bath, $3
Double room, bath, $5 per day
Handsome suites of 2, 3 rooms



ABSOLUTELY FIREPROOF

Subway Express Station.

Dinner de Luxe $1.35 *served in Blue Room and Grill.*

Exceptional Orchestra

M. P. MURTHA
Manager

Hotel Belleclaire

Convenient

JUST a few minutes from the pleasures that make New York famous. Yet, in addition, the Belleclaire is renowned for comfortable appointments, understanding service and spacious quietness. And remember that the pleasure of Belleclaire guests is the inspiration of our service.

Suites with bath $1600 *a year and up. Room and bath* $4 *a day and up.*

Write for literature and rates, or phone Endicott 7700.

BROADWAY AT 77TH ST.
NEW YORK

A TIME, LABOR AND MONEY SAVER

Many contractors found it a money-making proposition to install a Unit Sack Cleaner and Handy Sack Baler on their job.

The Machine pictured in the cut cleaned several hundred thousand sacks and paid for itself on this job alone.

It is only a matter of time before you will realize the necessity for our equipment. Why not write us immediately for further details?

HANDY SACK BALER COMPANY, MARION, IOWA

Pioneer manufacturers of sack equipment.

$2.50 Per Day *and upward*

is one reason for the rapidly growing popularity of the Hotel Martinique.

Another is the consistent economy of the entire establishment. Here you may enjoy a Club Breakfast at 45c., consisting of Fruit or Cereal, Bacon and Egg, and Rolls and Coffee—Special Luncheon and Dinners of superior quality are also served at the most moderate possible prices.

No location can be possibly more convenient than that of the Martinique. One block from the Pennsylvania Station (via enclosed subway)—Nine blocks from Grand Central—one block from the greatest and best Shops of the City—half a dozen blocks from the Opera and the leading Theatres—and directly connected with the Subway to any part of the City you wish to reach.

"The BEST, without extravagance"

Hotel Martinique

Affiliated with Hotel McAlpin

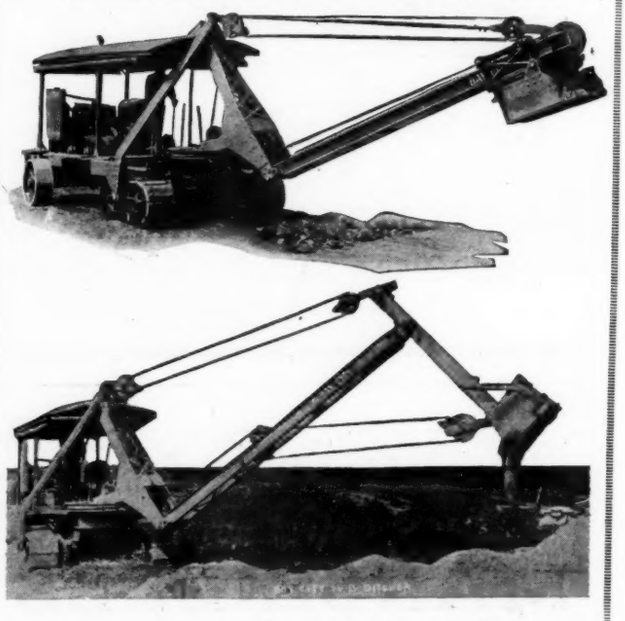
Broadway-32nd to 33rd Sts.

NEW YORK

A. E. Singleton, *Manager*

THE CONVERTIBLE BAY CITY—16-B

For Pavement Excavation, Road or Sewer Work



Operates Skimmer—Clamshell—Ditcher—Shovel

"A MACHINE FOR EVERY JOB"

For 14 Years Builders of Gasoline and Oil Excavators—Cranes—Walking Land Dredges

BAY CITY DREDGE WORKS

BAY CITY, MICH.

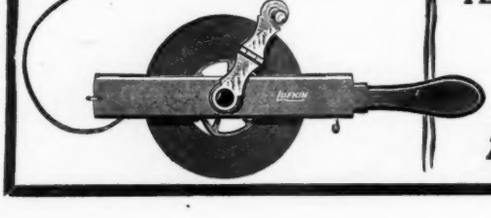
New York Office, 302 Broadway

LUFKIN ENGINEERS and CONTRACTORS

TAPES

Give Long and Satisfactory Service Even Under Severe Conditions of Use.

FROM SURVEYS TO FINISHED CONSTRUCTION AND INSPECTION WE HAVE PATTERNS BEST SUITED TO EVERY PURPOSE



Stocked by Hardware and Engineering Supply Houses.

Send for Catalogue.

THE LUFKIN RULE CO. SAGINAW, MICH. New York, London, Eng., Windsor, Can.

INDUSTRIAL LITERATURE

DESCRIBING MATERIALS AND EQUIPMENT FOR CONSTRUCTING, OPERATING AND MAINTAINING PUBLIC IMPROVEMENTS.

You can obtain the catalogs listed on this and the following pages by using the form at the bottom of this page or by writing to the company direct, giving the catalog number and mentioning PUBLIC WORKS.

CONTRACTORS' EQUIPMENT

Air Compressors

1. Ingersoll-Rand Portable Compressors are built in the sizes as gasoline engine or electric motor driven units. There are various styles of mountings or furnished without running gear. Ingersoll-Rand Co., 11 Broadway, New York. Bulletin 3415.

2. Sullivan Machinery Co., Chicago, has a new catalog describing portable air compressors, including WK-311 gas engine driven; WK-34 Fordson belt driven, and WK-32 electric motor driven. No. 77-N, 16 pages, 6x9.

3. Sullivan Machinery Co., Chicago, builds its angle compound air compressors in capacities from 400 to 3,700 cu. ft. in single or twin models for belt or direct connection to electric motor or oil engine. Bulletin 77-H, 32 pages, 6x9.

4. Domestic Engine & Pump Co., Shippensburg, Pa. Portable and compressors for all construction and building needs, illustrated. Mounting and detailed specification of types given. 12 pages, 8x9½.

5. Air Compressors, pneumatic tools for all purposes and air compressor pump combination units described in booklet by Schramm, Inc., West Chester, Pa. 35 pages, 6x9.

Asphalt Plants

10. Description of Portable Asphalt Plants from 20 tons up will shortly be available. They are a wholly new departure from anything existing to-day. Chase & Lyman, Inc., 12 Pearl St., Boston, Mass.

CONCRETE MIXERS

15. The American Cement Machine Company, of Keokuk, Ia., describes tilting mixers manufactured by it of various capacities up to size 7 and mounted on two or four wheels. 8 pages. 8½x11.

16. Chain Belt Concrete Mixers and Chain Belt Pavers are illustrated and described with complete specifications in a catalog by the Chain-Belt Company, Milwaukee, Wisconsin. 63 pages, 7½x9½.

17. Concrete Mixers manufactured by the Jaeger Machine Company, Columbus, O., described in booklet. 32 pages, 6x9.

18. Koehring Company, Milwaukee, Wis. Catalog describing paving and construction mixers manufactured from sizes of 7 cubic feet to 34 cubic feet. Two catalogs, 7¾x10¾, 48 and 96 pages respectively.

19. Koehring Company, Milwaukee, Wis. Pocket size booklet illustrating complete line, including various paving and construction mixers, trailers, subgrade planers, gasoline cranes, draglines, shovels, bar benders and cutters. 20 pages, 6½x3¾.

20. Koehring Company, Milwaukee, Wis. "Concrete—Its Manufacture and Use." Discussing various uses of concrete. 25 pages of tables, giving quantities of material for paving work. Board covers, 210 pages, 4½x7⅛.

Chutes and Towers, Concrete

25. The Insley Manufacturing Company, of Indianapolis, describes concrete chutes in connection with steel towers and Mast Hoist Plants in Catalogs 44 and 45. 95 pages and 16 pages, 8x11.

26. The Insley Manufacturing Company of Indianapolis describes steel towers and steel masts in connection with chutes for placing concrete, in Catalogs 44 and 45. 95 pages and 16 pages, 8x11.

Dredges

30. The Bay City Dredge Works, Bay City, Mich., issue Catalog D, describing Bay City Land Dredges for canal and open ditch excavation or cleanout and ditch maintenance work. Oil engine operated. 72 pages, 6½x10.

Drills

35. Sullivan Machinery Company, Chicago, builds its Rotator Type hand-held hammer drills in seven models for many rock drilling purposes. One is a steam engine. Bulletin 81-B, 32 pages, 6x9.

Drills, Tunneling, Water, Jet

36. Sullivan Machinery Company, Chicago, has a new catalog, No. 81-F, describing its DW-64 water jet tunnelling drill. 135 lb. weight. May be used on tripod or bar for down holes to 32 ft., or as 90 lb. hand drill with suitable handles. 16 pages, 6x9.

Drills, Hammer

37. Ingersoll-Rand Pneumatic Tools are available in a complete range of styles and sizes for a wide variety of work. They are the standard tools adopted by contractors, public utilities, etc. Ingersoll-Rand Co., 11 Broadway, New York. Bulletin 8000.

38. "Jackhamer" Rock Drills are operated by compressed air or steam and all excepting the smalles type can be equipped for wet drilling. There are five sizes. Ingersoll-Rand Co., 11 Broadway, New York. Bulletin 4046.

39. "100 and 1 Ways to Save Money," by the Ingersoll-Rand Company, will interest contractors. Illustrations of specifications of machines and tools. 70 pages, 8½x11.

Dump Bodies, Steel

45. Ford Truck Steel Dump Bodies and hydraulic hoists are manufactured by the Wood Hydraulic Hoist & Body Company, 4196 Bellevue Ave., Detroit, Mich.

46. Hoists and Dumping Bodies for trucks and Dumping Units. Bulletins issued by the Horizontal Hydraulic Hoist Co., 35 25th St., Milwaukee, Wis.

Loaders and Unloaders

55. The Universal Road Machinery Company, Kingston, N. Y., issues two bulletins describing the Reliance Portable Car Unloader and Reliance Chip and Sand Spreader.

Motor Trucks and Tractors

60. An illustrated pamphlet picturing American-LaFrance commercial trucks in actual service with contractors, builders and allied lines, issued by American-LaFrance Fire Engine Co., Elmira, N. Y.

61. A catalog illustrating and describing American-LaFrance commercial trucks as completely manufactured by the American-La France Fire Engine Company in their modern plant at Bloomfield, N. J.

62. The Ford Motor Company issues a monthly magazine, The Fordson, dealing with agricultural uses of the Fordson Tractor. 16 pages, 8¼x11¼.

63. The Ford Motor Company issues a monthly magazine, Power & Haulage, dealing with industrial and commercial uses of the Fordson Tractor and Ford Truck. 16 pages, 7½x10¾.

64. The General Motors Truck Company, Pontiac, Mich., issues a booklet illustrating the service of GMC trucks in road construction and maintenance. "Money Saving Transportation." 16 pages, 8x11.

65. Specifications by parts of GMC trucks, motor and chassis are given in a booklet, "General Motors Trucks," issued by the General Motors Company, Pontiac, Mich. 48 pages, 8x11.

66. The Huber Mfg. Co., Marion, Ohio, issues bulletins, "Huber Tractors" and "The Huber Scarifier." Illustrations of machines in operation and testimonials from users.

67. The J. T. Tractor Company, Cleveland, Ohio, sends descriptive bulletin illustrating the design, equipment and application of J. T. Tractors.

68. Why U. S. Motor Trucks are "as good as their name" is told in an illustrated catalog by the United States Motor Truck Company, Cincinnati. Specifications, capacity, testimonials, 24 pages, 9x12.

69. "Kerosene Power, the Low-Price Road Builder," bulletin by the International Harvester Co., Chicago, shows economy of kerosene tractors. Illustrations, specifications, and figures on cost of operation.

70. "There Is a Definite Reason for Every Road Building Success," issued by International Motor Company, 25 Broadway, New York, tells how three big operations were handled and reasons for success.

71. "Earth Moving and Hauling of Building and Road Materials," 32-page illustrated booklet showing part of motor trucks in highway building and bulk hauling. International Motor Company, 25 Broadway, New York.

(*Continued on page 76*)

USE THIS FORM FOR ORDERING CATALOGS

PUBLIC WORKS,
243 West 39th Street, New York City.

Gentlemen:

Please send me the following catalogs listed under Industrial Literature Section

.....
(INDICATE BY NUMBERS)

....
NAME ST. ADDRESS CITY

Pumps, Contractors'

75. The Edson Manufacturing Corporation, Boston, describes its improved designs in diaphragm pumps, both hand and power; odorless force pumps, and suction hose for the same and other pump accessories. 9 pages, 8½x11.

76. Domestic Engine & Pump Company, Shippensburg, Pa. Centrifugal, diaphragm and trench force pumps described and illustrated. Specifications by parts of electric-driven pumps and gas power units. 8 pages, 8x9½.

77. Diaphragm and Fire Pumps for trenching, trench pump units and accessories. The Edson Mfg. Corporation, 375 Broadway, New York.

78. Diaphragm, Duplex Lift, Centrifugal and Force Pump Units. Booklet by Schramm & Sons, 140 West St., New York, and 308 N. 4th St., Philadelphia. Also Schramm Engines and Hoists. 35 pages, 6x9.

Road Finishing Machines

85. The Heltzel Steel Form & Iron Co., Warren, Ohio, publish a treatise of finishers, strikeoffs and graders, including descriptions of hand finishers, automatic strikeoff and grader.

Road Rollers, Scrapers, Graders, etc .

90. The Buffalo Springfield Roller Company, Springfield, Ohio. Pocket size booklet with return card, showing all types of Buffalo Springfield steam and motor rollers and scarafiers. 20 pages, 6¼x3½.

91. The Monarch Steam Road Roller, with Steam Scarafier, is described in a catalog issued by the Good Roads Machinery Company, Kennett Square, Pa. 32 pages, 7x10½.

95. Road Machinery of all kinds is manufactured by the Austin-Western Road Machinery Company, Chicago. Special features of graders, scarifiers, crushers, elevators, sprinklers, culverts, etc. Catalog 24. 64 pages, 9x12.

96. The Case Road Machinery Line, including rollers, tractor plows, rock crushers, scrapers, etc., described in well-illustrated catalog. The J. I. Case T. M. Co., Inc., Racine, Wis. 40 pages, 9x12.

97. The Good Roads Machinery Co., Inc., Kennett Square, Pa., issues a catalog describing its line of rock crushers (portable and stationary), elevators, screens, bins and other quarry equipment. 36 pages, 8½x11.

98. The Russell Grader Manufacturing Company of Minneapolis issues an illustrated catalog of its road machines. planers, finishers. drags, scrapers, etc. Printed in two colors and handsomely gotten up. 68 pages. 8½x11.

99. Acme Road Machinery Co., Frankfort, N. Y., issues descriptive bulletins of gas and steam rollers, rock crushers, graders and other road building machinery.

—. The Austin-Western Road Machinery Company, of Chicago, issues a catalog entitled, "The Austin-Western Line," describing graders, scrapers, screens, rollers, scarifiers, etc. 64 pages, 9x12.

101. Self-Loading Scrapers, Baker Maney. 1¼- and ¾-yard models described and photographs of trains two to six behind tractors. Catalog 209, Baker Mfg. Company, 525 Stanford Avenue, Springfield, Illinois.

Steam Shovels, Cranes, Excavators

110. The Bay City Dredge Works, Bay City, Mich., issue Catalog F, describing one-man operated, convertable gasoline or electric caterpillar mounted shovels for trench excavation and general material handling work. 52 pages, 6x9.

111. The Erie Steam Shovel Co., Erie, Pa., will mail detailed specifications and illustrations of dragline excavators and steam shovels. 8½x11.

112. The Erie Steam Shovel Company, Erie, Pa., issues Bulletin S-30, describing Erie Convertible Cranes. 24 pages, 8½x11.

113. Erie Caterpillar Mountings for Steam Shovels and Cranes with illustrations of distinctive Erie features, are described in Bulletin S-60, issued by the Erie Steam Shovel Company, Erie, Pa. 20 pages, 8½x11.

114. Harnischfeger Corporation, successor to Pawling & Harnischfeger, Milwaukee, describes fully the construction and operation of gasoline or electric powered shovels, draglines, skimmer scoops and cranes. 34 pages, 8½x11.

115. Harnischfeger Corporation, successor to Pawling & Harnischfeger, Milwaukee, Wis., describes fully the construction and operation of ¾ and 1 cu. yd. gasoline or electric shovels. 34 pages, 8½x11.

116. The Insley Mfg. Co., Indianapolis, Ind., issues special booklets on portable gas unit excavators, concrete construction and contractors' equipment.

117. Koehring Company, Milwaukee, Wis. Bulletins on two sizes of ¾ and 1 cubic yard bucket capacity of gasoline cranes, draglines and shovels.

118. Sewer and trench excavating units, clamshell and dragline shovels, involving deck and railroad type excavators, are illustrated in a series of bulletins by the Osgood Company, Marion, Ohio.

119. Osgood continuous tread revolving and railroad type shovels and cranes at work in mines, quarries, road cuts, etc. The Osgood Company, Marion, Ohio. Catalag. 23 pages, 9x11.

120. The Orton & Steinbrenner Co., Chicago, issue catalog No. 20, describing construction, equipment and operation of 7 and 12-ton crawling tread and road wheel locomotive cranes.

Steel Forms

125. The Heltzel Steel Form & Iron Company, Warren, Ohio, issue a series of booklets describing Heltzel Curb and Gutter Forms, Steel Road Forms and Sidewalk Forms.

FIRE FIGHTING EQUIPMENT

140. A catalog containing illustrations and specifications of all types of modern motor fire apparatus as manufactured by the American-LaFrance Fire Engine Company, Elmira, N. Y.

141. The General Motors Truck Company, Pontiac, Mich., issues a booklet illustrating and describing newest features of GMC fire trucks and trailers. 25 pages, 8x11.

Modern Pumps for Motor Fire Apparatus

142. An illustrated booklet by the American LaFrance Fire Engine Company, Elmira, N. Y., which describes the relative merits of rotary, picton and centrifugal pumps for motor driven fire apparatus.

PAVING MATERIALS

Asphalt

150. The Headley Good Roads Company, Franklin Trust Bldg., Philadelphia, Pa., describe their line of grade crossings for steam and electric railroads in booklet. 30 pages, 4x6.

151. "From Maine to Miami," booklet by the Standard Oil Company of New York, illustrates well-known highways paved with Standard Asphalt Compounds, Standard Oil Company of New York, 26 Broadway.

Brick

155. "The A-B-C of Good Paving." Features of engineering involved and principles of brick paving. Published by the National Brick Paving Manufacturers' Association. 16 pages, 6x9.

156. Recommended Specifications for laying brick pavements are contained in a handy booklet by the National Paving Brick Manufacturers' Association, Cleveland, Ohio. 92 pages, 6x9.

Concrete Curing Compound

175. The Dow Chemical Company, Midland, Mich. "How to Cure Concrete" is a "manual of instruction on the curing of concrete pavements." A handy, useful volume, well illustrated. 47 pages, 5½x7½.

176. The Dow Chemical Company, Midland, Mich. "How to Maintain Roads" is a manual of information on road building and maintenance. Contains tables of composition, grading, etc.

Cement

180. The Atlas Lumnite Cement Co., 25 Broadway, New York, issues an illustrated bulletin giving tests and applications of the Atlas Lumnite product. "28-day concrete in 24 hours" described in detail.

Expansion Joints

195. The Philip Carey Company, Cincinnati, Ohio, presents a catalog of Carey Elastic expansion joint with physical and chemical description, numerous illustrated examples of use for streets, sidewalks and elsewhere. 70 pages, 8½x10½.

196. The Hoosier Asphalt Company, Alexandria, Indiana. Bulletin on Expansion Joints and Asphalt Compositions.

Rail Filler

201. The Philip Carey Company, Cincinnati, issues literature describing Elastite Rail Filler, a preformed asphaltic cushion fitting all rails, which absorbs rail movement. excludes water and frost and materially reduces track noise.

Tarvia

205. "Tarvia," an attractive booklet issued by The Barrett Manufacturing Co., is a lengthy discussion of Tarvia paving compositions for various road conditions. 48 pages, 6x9.

ROAD AND STREET MAINTENANCE EQUIPMENT

Heaters, Asphalt and Tar

220. The Mohawk Asphalt Heater Company, Scotia, N. Y., presents a New Bulletin describing the Original Improved "Hotstuf" Asphalt Heater, an economical oil burning heater, for general construction and maintenance. 4 pages, 6½x10.

221. Connery & Company, Inc., of Philadelphia, has issued a new catalog describing improving types of Tar and Asphalt Heating Kettles for the road contractor. 30 pages, 6½x8¼.

222. Connery & Company, Inc., of Philadelphia, has issued Bulletin No. P-1 describing Oil Burning Patrol Patching Heater for Paving Contractors, Street and Highway Departments.

223. Chase & Lyman, Inc., 12 Pearl St., Boston, Mass., will issue shortly a new catalog describing the Merrill Oil Burning Indestructible Kettle. All sizes up to 1,000 gallons content capacity.

(*Continued on page 78*)

USE THE COUPON AT BOTTOM OF THE FIRST PAGE IN THIS SECTION

Look Beyond the Product —to the Institution!

NOT so many pounds of steel and iron welded into a machine —but *a production unit that delivers a definite service.* Not nuts, bolts and screws, a drum and an engine—but *dependable performance! That is what we ship to every contractor who buys a Jaeger Paving Mixer or a Jaeger Building Concrete Mixer.*

For thirteen years the Jaeger organization has led the field in concrete mixing machinery. We have built with minute care—knowing that each machine must measure up to the high standards of Jaeger quality and reputation. It has been this spirit of faithfulness to a trust that has won the Jaeger Institution its record of sterling worth and value.

Jaeger Pavers are an integral part of the Jaeger Line. Produced in answer to a definite demand, they have filled the need for a quick-action, heavy-duty paver, of light mobile weight. They are equipped with the Jaeger Tilting-Drum, with open and loader bucket, water tank, traction both ways and every possible labor-saving device. And back of every Jaeger Paver is *the Jaeger guarantee of complete satisfaction* and the Jaeger Institution that makes good on every promise.

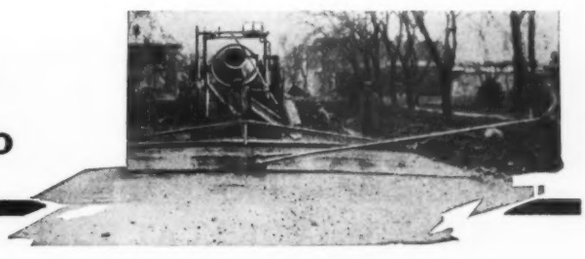
Write today for complete descriptive catalogs— also, prices and the name of our nearest dealer.

Stocks carried in all principal cities. Write us for the name of the distributor nearest you.

All tilting-drum mixers are not Jaegers. The "Jaeger" is far superior to any mixer made and should not be confused with inferior machines even though they be of the tilting-drum type. Protect yourself by getting the "genuine Jaeger." Look for the name on the drum and the flat spots inside!

The Jaeger Machine Company

400 Dublin Road, Columbus, Ohio



224. A catalogue issued by Littleford Bros., Cincinnati, Ohio, illustrates completely their line of Tar and Asphalt Heaters, Paving Tools and Equipment for road and street construction and maintenance work.

225. Heaters of all kinds for Road and roofing described with specifications in a booklet by the Connery Company, Philadelphia, Pa.

226. Littleford Bros., of Cincinnati, Ohio, issue a new illustrated book showing the application of the Andresen Road Repair Outfit in maintenance of Roads and Streets. 32 pages, 8¼x11.

Pavement Breakers

235. Ingersoll-Rand Paving Breakers are used for tearing up pavement, concrete, ashphalt, wooden block, asphalt block, bithulithic or other road surface materials. Ingersoll-Rand Co., 11 Broadway, New York. Bulleltin 4051.

236. Sullivan Machinery Co., Chicago, describes Sullivan Busters or Concrete Breakers, Hammer Drills, 65 lb. non-rotating type, in Bulletin 81-D. Machines especially adapted for cutting asphalt and concrete pavements. 8 pages, 6x9.

Snow Removers

240. The Hadfield-Penfield Steel Co., Bucyrus, Ohio, has just issued new circulars describing Fordson Snow Removers and Hadfield-Penfield One-Man Graders.

241. Baker Snow Plows for Motor Trucks and Tractors, "V" and Straight Blade in various models and sizes. Catalog 216, 48 pges. Baker Mfg. Co., 525 Stanford Avenue, Springfield, Ill.

242. The Champion Snow Plow, made in 8 and 10-foot sizes, for clearing snow from city streets and country roads, is illustrated and described in a new catalog issued by The Good Roads Machinery Co., Inc., Kennett Square, Pa. 32 pages, 6⅞x10¼.

243. Caterpillar tractor snow removers at work are illustrated in a booklet issued by the Holt Manufacturing Company, Inc., Peoria, Ill., and Stockton, Calif. Specifications and testimonials. 10 pages, 8½x11.

Road Sprayers

250. The Cressy Road Sprayer Mfg. Company, 452-470 2nd St., Everett, Mass. Booklets describing horse-drawn and motor sprayers and complete specifications and illustrations of each model.

251. A new catalog, issued by the Good Roads Machinery Co., Inc., Kennett Square, Pa., illustrates and describes the Champion Heating Distributor for applying all kinds of bituminous materials. 24 pages, 8½x11.

SEWAGE DISPOSAL APPARATUS

275. The Door Company, 247 Park Ave., New York City, in Bulletin 20, describes the use of its appliances for treating municipal sewage and industrial wastes and water. 8 pages, 8x11.

276. The Link Belt Company of Philadelphia describes the Tark Sewage Screen, an installation manufactured for the Milwaukee Sewage Plant. 16 pages, 8½x11.

277. The Pacific Flush Tank Company, of Chicago and New York, publish eight separate catalogs on Sewer and Sewage Disposal Automatic Equipment, including pumps, Imhoff Tanks and Sewer Joint Compounds.

278. The Sanitation Corporation, 165 Broadway, New York, Sanitation screens and gates described in a series of illustrated bulletins, 126-2, 126-3, L-19, B-9.

279. The Direct Oxidation Process Corporation of Philadelphia, in a treatise describes the principles of its electrochemical process for treating waters, sewage and industrial wastes.

280. Yoemans Brothers Company, 1433 Dayton St., Chicago, issues bulletins describing Shone Pneumatic Sewage Ejectors and Yoemans Centrifugal Sewage Pumps for Municipalities. Leaflet E-2200 describes Duplex Centrifugal Sewage Ejectors.

281. The Norton Company, Worcester, Mass. Porous plates of Alumina; used among other purposes, for activated sludge tanks. 27 pages, 5x7.

282. Advantages of Liquid Chlorine for disinfection given in booklet issued by the Electro Bleaching Gas Co., 9 East 41st St., New York. General Filtration Company, Rochester, N. Y., issues two booklets: (a) General data on the Activated Sludge Process. (b) Booklet descriptive of Filtros, the diffusing medium in practically every activated sludge plant.

283. Paradon Engineering Company, Long Island City, N. Y. Apparatus for controlling application of chlorine to water and sewage. 4 pages, 8½x11.

Sewage Pumps

Wood and Trash Sewage Pumps to suit varying needs are described in illustrated catalog 2o-A, issued by the Pacific Flush Tank Co., Singer Building, New York.

Vitrified Clay Pipe

286. Traps, Elbows, T branches, slants and sockets and all standard clay pipe fittings. Catalog F, The Evans Pipe Company, Uhrichsville, Ohio, gives illustrations and prices.

287. Roming Clay elbows, channel pipe, T sections, reducers, etc. Illustrated in folder by the Romig Clay Product Company, Uhrichsville, Ohio.

288. Portland Vitrified Clay piping made especially for Chlorine lutes and acid systems, also sectional conduits, vitrified cable ducts and sewer pipe. Booklet by Portland Stoneware Company, 49 Federal Street, Boston.

274. Sewer Pipe and Fittings of all kinds illustrated, with prices and tables of calculation for contractors, in booklet. "Clay Products," by the Robinson Clay Product Company, Akron, Ohio.

Pumps

290. The Aldrich Pump Company publishes a new Bulletin on High Pressure Road Pumps, Built Especially for Contractors. Bulletin No. 82. It also publishes a Bulletin No. 50, Engineering Tables, forwarded on application.

291. Layne & Bowler Co., Memphis, Tenn. Booklet describes Layne Well System and Vertical Turbine Pumps and explains guaranteed well water production. 64 pages, 7½x11.

292. Pumps, well strainers, tube well supplies, pumping engines, pipe and water works accessories. A. D. Cook Company, Lawrenceburg, Ind. Catalog. 65 pages, 7x10.

293. The Kinney Mfg. Company, Boston, sends a folder of bulletins on Rotating Plunger Pumps, Unloading Pumps, also tables of information for water works calculations.

294. Aldrich Utility Water Systems, triplex pumps, boiler feed pumps, receivers and engine pump combinations. Bulletin of specifications of each model. The Aldrich Pump Co., Allentown, Pa.

STREET CASTINGS

300. Cast iron sewage blocks, ventilators, manhole covers and inlets, valves, etc., described in pamphlet by the South Bend Foundry Co., South Bend, Ind.

301. The Burch Sewer Inlets, manufactured by the Burch Plow Works Co., Crestline, Ohio, are illustrated in detail with complete specifications accompanying. Booklet. 30 pages, 6x9.

TRENCHING MACHINES

310. Harnischfeger Corp., successor to Pawling & Harnischfeger, Milwaukee, describes fully the construction and operation of wheel and ladder type gasoline powered trenchers for cutting trenches of various widths up to 18 ft. in depth. 34 pages, 8½x11.

311. Sullivan Machinery Company, Chicago, describes its Pneumatic Clay Spaders for surface trenching or underground culvert and tunnel work in Bulletin 70-X. Long and short handles are provided, and spades of different sizes. 4 pages, 6x9.

STREET CLEANING AND REFUSE DISPOSAL

Flushers

320. A special folder describing GMC Flusher units is issued by the General Motors Company, Pontiac, Mich. Specifications of each model with illustrations.

Vacuum Street Sweepers

325. Vacuum Street Sweepers made by the Butler Mfg. Company, 12411 St. Clair Ave., Cleveland, Ohio, described and illustrated in folder.

Wagons and Carts

326. The Convertible Wagon Trailer Company of Buffalo, N. Y., issues two pamphlets—"Rear Dump Wagons for Refuse Collectors" and "Convertible Wagon Trailer" for refuse haulage. Illustrated catalogs. 20 pages. 8½x11.

327. Wagons and Carts for all purposes, dump carts, wet garbage wagons, lawn carts and pick-ups. Columbia Wagon Company, Columbia, Pa. Catalog. 40 pages, 8x9½.

Garbage Disposal Plants

INCINERATION FOR MUNICIPALITIES

330. The Decarie Incinerator Company of New York City has published a description of its 300-ton incinerator at 56th St. and 12th Ave., New York City. Profusely illustrated. 8 pages, 8x10.

TRAFFIC GUIDES AND SIGNALS

340. "Municipal Street Sign Co., 296 Broadway, New York, N. Y., describes a complete line of Cross Street Signs with Posts, White Way Signs and Traffic Beacons. Municipal Products are designed for Durability, Visibility and Attractiveness.

341. The Essco Manufacturing Company of Peoria, Ill., now have for distribution a new 22-page bulletin descriptive of the Essco Stop and Go Signals and Controlling Devices. Full detailed information on traffic control is contained therein.

342. Complete catalog in color, size 8½x11, descriptive of all classes and styles of automatic traffic control units, Stop and Go systems, Mushroom Traffic Lights and School and Hospital Zone Markers. Essco Manufacturing Company, of Peoria, Ill.

(*Continued on page* 80)

USE THE COUPON AT BOTTOM OF THE FIRST PAGE IN THIS SECTION

Winning Big Savings

The time is past when Highway Departments, Street Commissioners and Road Supervisors could sit back and wait for the snow to melt away. The automobile has changed all that and now demands that the roads be kept open and that communication and traffic be maintained every day in the year.

Much of the road equipment in existence is not suited to such work and is underpowered. It is costly to use and money can be saved. This can easily be demonstrated and an immense saving effected.

Hadfield-Penfield One-Man Graders and Rigid Rail Tracks attached to the Fordson, is all-the-year-around machinery, suited equally well to the road building and maintenance work of the summer and to the snow and ice battle of the winter. In the summer it scarifies, grades, planes, rolls and digs ditches. In the winter it is kept busy maintaining open roads and streets. On the heaviest work, and for the job that requires super-power it can be equipped with H-P Rigid Rail Tracks. Regardless of the work it is called upon to perform, winter or summer, the H-P One-Man Grader divides the cost into four parts and saves three of those for the buyer.

Road officials who want a proposition that will keep the Fordsons moving all winter, as well as all summer, will do well to write at once for the full details.

The Hadfield-Penfield Steel Co.

Bucyrus, Ohio

See us at the Chicago Road Show

Space N. C. 29

RIGID RAIL TRACKS

HADFIELD PENFIELD

ONE MAN GRADER

343. Warning Signals for the protection of school children electrically illuminated for use with or without gongs, are fully described in literature now available. Manufacturers are Essco Manufacturing Company, Peoria, Ill.

344. A two-fold, two color circular, descriptive of warning lights for use in connection with school zones, hospital zones, etc. Essco Manufacturing Company, Peoria, Ill.

WATER WORKS EQUIPMENT

Air Lifes

360. Sullivan Machinery Co., Chicago, describes air life well pumping in catalog 71-H, including authentic description of air lift methods, apparatus and results secured by typical installations. Useful data and tables are included. 48 pages, 6x9.

Cement Lined Pipe

365. Steel or Wrought Iron Pipe lined with cement and special lead-lined joints, manufactured by the Cement Lined Pipe Co., of Lynn, Mass.

Air Lifts

368. The Mueller Co., Decatur, Ill. Copper pipe for water works services and patented connections for jointing to corporation stops, iron pipe, etc. 22 pages, 4½x6.

Couplings and Tees

372. S. & S. Easy-on-Pipe Couplings and Tees, especially adapted for water and gas pipes of ¾-inch to 2-inch diameter. 4 pages, 4x8½. George H. Snell Company, Attleboro, Mass.

Hydrants

375. "R. D. Wood & Co., Philadelphia. Handy circular describing and illustrating "Mathews" Fire Hydrants, Gate Valves and other water works appurtenances. 16 pages, 7¾x10¾.

376. Holyoke Fire Hydrants, Gauges, Cases, etc., manufactured by the Norwood Engineering Co., of Canada, Cowansville, P. Q., are described in bulletins of illustrations and specifications.

377. Gate Valves, Fire Hydrants, Indicator Ports, Floor Stands, etc., together with tables of calculation for mechanical engineers. Catalog 11, leather-bound, 100 pages, 6x9. Darling Valve & Mfg. Company, Williamsport, Penna.

Meters

380. The Buffalo Meter Company, Buffalo, issues a very complete catalog describing Niagara and American disc water meters. These meters are made with either solid type casing or frost bottom casing.

381. The Buffalo Meter Company, Buffalo, issues a special catalog describing Niagara Oil and Gasoline Meters, which explains the method of installing and operating these meters.

382. The Federal Meter Company, Brooklyn, N. Y., gives descriptions of Water Meters and price list in folder. 6 pages, 3½x6.

383. "Water Meter Simplicity" by the Badger Meter Manufacturing Co., Milwaukee, Wis., is a neat booklet of information about Badger Meters and their construction. 22 pages, 6½x9.

384. The Pittsburgh Meter Company, 7800 Susquehanna St., Pittsburgh, Pa., presents an attractive, convenient catalog illustrating and describing and giving complete specifications of their various types of water meters. 6x9.

385. The Venturi Hot Water Meter, by Builders' Iron Foundry, of Providence, R. I., illustrates installation of their instrument, which records rate of flow and registers total pounds or gallons. 20 pages, 6x9.

386. Frost-proof disc water meters, made in three sizes and constructed to withstand severe temperatures, described and illustrated in booklet by Thomson Meter Company, 100-110 Bridge Street, Brooklyn, N. Y.

387. Lambert Current and Duplex Meters, made for heavy duty and absolute accuracy, described with prices and specifications in booklet by Thomson Meter Company, 100-110 Bridge Street, Brooklyn, N. Y.

Pipe, Cast Iron

390. The McWane Cast Iron Pipe Co., Birmingham, Ala., issues Catalog F, describing Cast Iron Pipe, sizes 1¼ through 6 inches, equipped with factory-made Precalked lead joints in the bells.

391. R. D. Wood & Co., Philadelphia, issues a new booklet giving weights and dimensions of Cast Iron Pipe and Fittings. A handy reference book for Municipalities and Contractors. 48 pages. 7¾x10¾.

392. James B. Clow & Sons, 534 Franklin Street, Chicago. Complete catalog and data book, for water works superintendents and engineers, showing cast iron pipe, fittings, manholes, specialties. Sent on request.

393. Cloth-bound Pocket-size volume, "AMERICAN PIPE MANUAL," 140 pages, standard specifications and valuable pipe information. Published by the American Cast Iron Pipe Company, P. O. Box 151-2, Birmingham, Ala.

394. Standard specifications for Cast Iron Water Pipe, De Lavand, and Special Castings, adopted from American Waterworks Association and American Cast Iron Pipe Company, Box 151, Birmingham, Ala.

395. American Standards for flange fittings and standard specifications for Cast Iron Pipe adopted by American Waterworks Association and American Gas Association. Booklet by Glamorgan Pipe & Foundry Co., Lynchburg, Va.

Pumps

396. Pumps of all kinds and for all municipal and industrial purposes illustrated with specifications, also engineering tables of pressure and heads. Bulletins issued by Goulds Manufacturing Company, Seneca Falls, N. Y.

397. Economies through using specially-constructed centrifugal pumps for municipal water plants and sewage are explained in illustrated folders by the D'Olier Centrifugal Pump & Machine Company, 165 Broadway, New York.

Pipe Jointing Materials

410. Leadite as an economical composition for pipe joints described in a bulletin by the Leadite Company, Land Title Building, Philadelpha, Pa.

Pumping Engines

415. "When Power Is Down," by the Sterling Engine Company, Buffalo, N. Y., gives illustrations from various cities of Sterling Pumping Engines in use, with recommendations of models for standby services.

Sluice Gates

420. Sluice Gates of all kinds, Roller Bearing Pedestals, Hoisting Standards, Intake Gates, Plug Drain Values and other Water Works Appliances described in catalog by Coldwell-Wilcox Company, Newburg, N. Y. 34 pages, 8x10½.

Water Main Cleaning

425. The National Water Main Cleaning Co., 50 Church St., New York, issues a list of cities, with dates, in which water pipes have been cleaned by them.

MISCELLANEOUS

Explosives

430. A pamphlet by the E. I. du Pont de Nemours Company, Wilmington, Del., embodying the results of years of study by S. R. Russell.

Gas Engines

435. The Witte Engine Works, of Kansas City, Mo., describes the Witte Throttle Governor Engine, an internal combustion suitable for concrete mixers and other contracting requirements. 8 pages, 6½x8½.

Steel Tapes

440. The Lufkin Rule Company, Saginaw, Mich.; New York; Windsor, Canada. Manufacturers of Measuring Tapes, Boxwood Rules, Spring Joint Rules, Straight and Folding Steel Rules, Fine Mechanics' Tools. General catalog No. 11.

Portable Saw Riggs

445. The American Saw Mill Machinery Co., Hackettstown, N. J., issue to attractive booklets on Saw Mill Machinery. Catalog No. 23, 208 pages, 6x9, and Bulletin No. 20, illustrate the various models and their application.

446. The American Saw Mill Machinery Company, Hackettstown, N. J., issues Bulletin No. 80, illustrating and describing Woodworking Machinery especially adapted to the use of Contractors on the job or in the Shop.

Man-Power Pulley Jacks

450. Pullmco, the portable man-power pulley jack, capable of moving up to 100 tons, fully described and illustrated in pamphlet by Puller Manuacturing Co., Inc., 600 West 57th St., New York City. 16 pages, 9x12.

Street Light Refractors

460. Holophane Glass Company, Newark, Ohio. Four-way and 2-way refractors for confining light rays to line of street, or of intersecting streets. 12 pages, 8x10.

461. Chlorine and Salts for purification of water and disinfection of sewage with description of Pennsylvania Salt Manufacturing Company's facilities for supplying these cheaply. Booklet, 15 pages, 3½x6. Widener Building, Philadelphia.

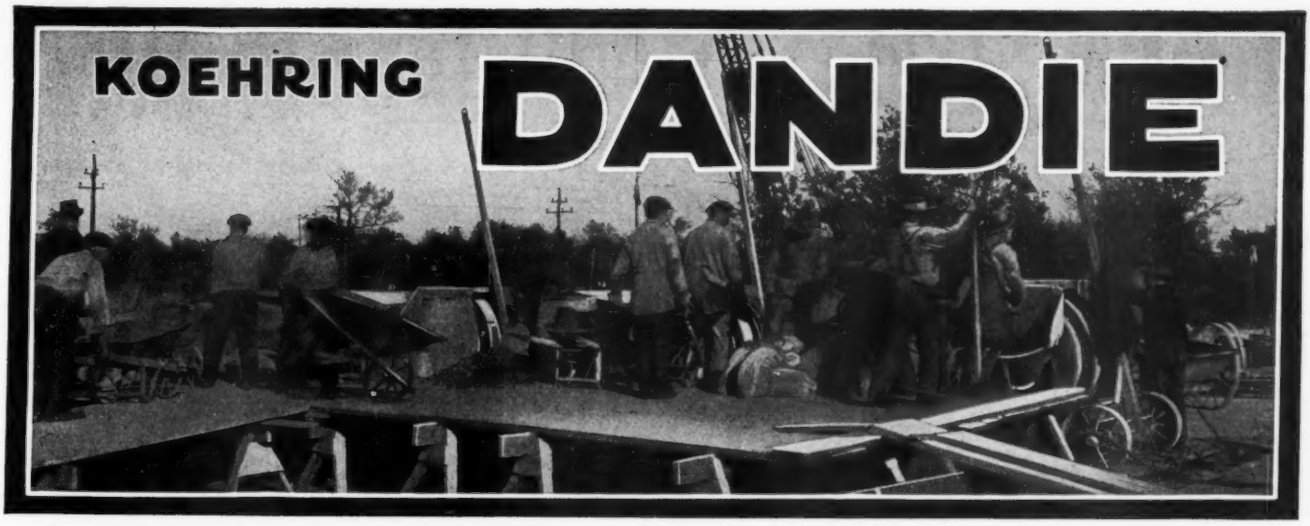
462. Cement Bag Cleaners. Small economies which become big savings are described in folders by the Handy Sack Baler Company, Marion, Iowa. Makers of Perfection Sack Cleaner for saving adhering contents of cement bags.

463. Correct Lubrication of Worm-driven type fire apparatus told in an illustrated booklet by The Seagrave Company, Columbus, Ohio. Instructions for lubricating by parts for all conditions, 19 pages, 6x9.

464. Buckets, Elevator Boots, Sprocket Wheels, Chain Belting, Chain Tighteners, Hand Wheels. Catalog No. 32, "Jones Sprocket Wheels & Chain Belting." W. A. Jones Foundry & Machine Co., 4401-51 West Roosevelt Road, Chicago.

465. Louisville Rotary Steam Tube Dryer, particularly adapted to drying garbage or activated sludge, also Counter Current and Direct Heat Dryers. General Catalog, 8x11, 30 pages. Louisville Drying Machinery Co., Louisville, Kentucky.

466. Protection for bridges, smoke stacks and all metal work by painting with silica-graphite is explained in three illustrated booklets, 3½x6½, by the Joseph Dixon Crucible Co., Jersey City, N. J.

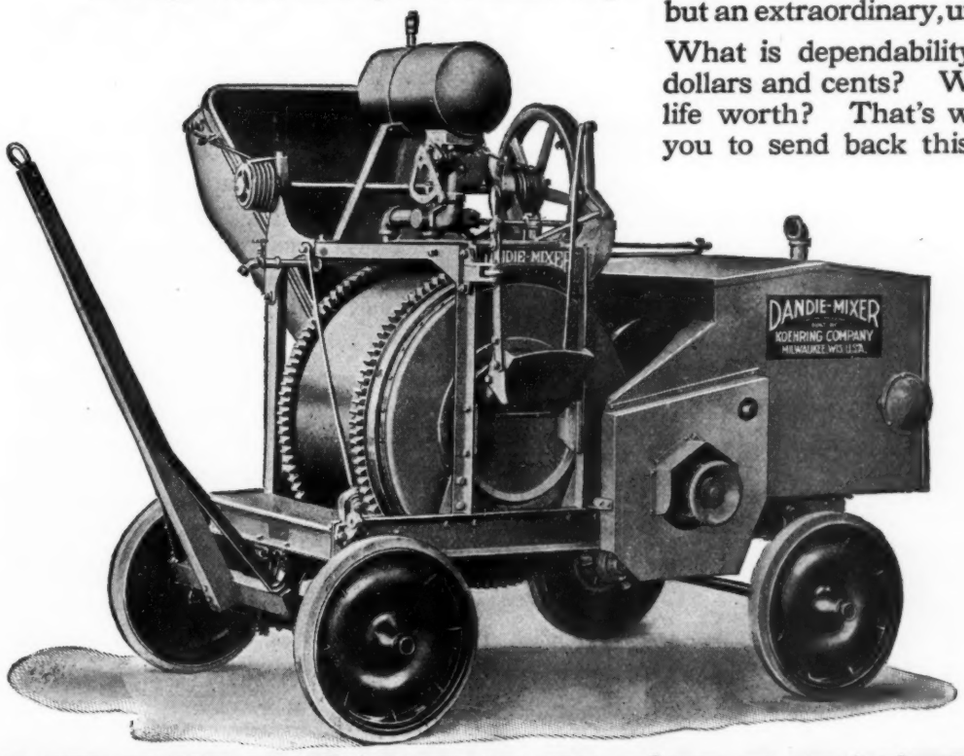


Send Back the Coupon!

RIGHT there at the bottom of this ad! The coupon will bring back to you the Dandie catalog—giving you full details of this Koehring light mixer. It's light, easily portable, but it's every inch a *Koehring*.

You'll find this catalog downright valuable to you in showing what Koehring experience, Koehring standardization, and big volume make possible in the way of giving you a strong, no-stop, long service mixer, and still stay within the price range for light mixers. You'll discover not only that the Dandie is an extraordinary mixer, but an extraordinary, unapproached value.

What is dependability worth to you in dollars and cents? What is long service life worth? That's what it's worth to you to send back this coupon.



Dandie Capacities

7 cu. ft. Mixed Concrete. Gasoline power. Power charging-skip or low charging platform with hopper, light duty hoist, automatic water measuring tank. Standard or flanged rim steel wheels, or disc wheels, rubber tired. Mixes mortar as well as concrete.

KOEHRING COMPANY

PAVERS, MIXERS, CRANES, DRAGLINES, GASOLINE SHOVELS

MILWAUKEE, WISCONSIN

Sales Offices and Service Warehouses in all Principal Cities

Foreign Dept., Room 1370, 50 Church St., New York.

Canada, Koehring Company of Canada, Ltd., 105 Front St., East, Toronto, Ontario.

Mexico, F. S. Lapum, Cinco de Mayo 21, Mexico, D. F.

A 2259-I

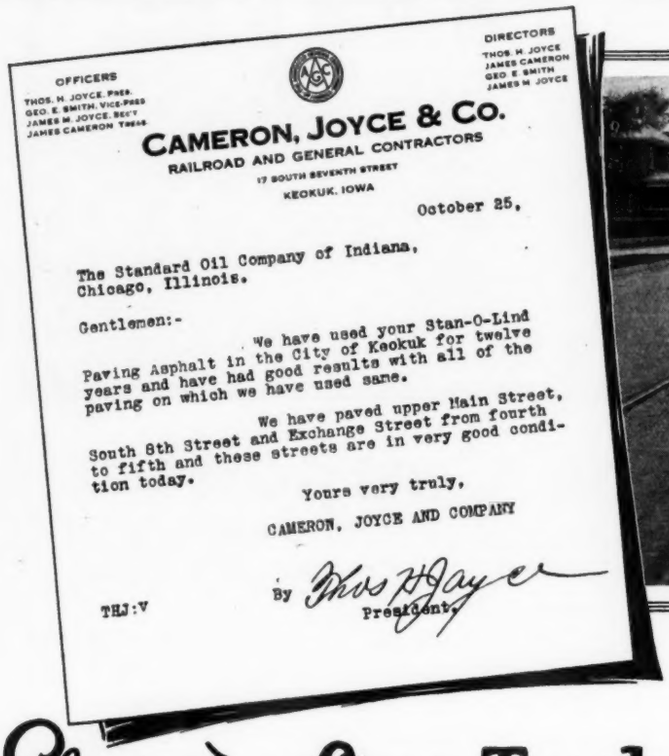
Send Back this Coupon!

KOEHRING COMPANY, Milwaukee, Wisconsin
Please send me by return mail catalog of Koehring Dandie Light Mixer. Also price with equipment as follows: D-14

Name_____

Address _____

KEOKUK STREETS STAND TEST of TIME



OFFICERS
THOS. H. JOYCE, PRES.
GEO. E. SMITH, VICE-PRES
JAMES M. JOYCE, SEC'Y
JAMES CAMERON, TREAS

DIRECTORS
THOS. H. JOYCE
JAMES CAMERON
GEO. E. SMITH
JAMES M. JOYCE

CAMERON, JOYCE & Co.
RAILROAD AND GENERAL CONTRACTORS
17 SOUTH SEVENTH STREET
KEOKUK, IOWA

October 25,

The Standard Oil Company of Indiana,
Chicago, Illinois.

Gentlemen:-

We have used your Stan-O-Lind Paving Asphalt in the City of Keokuk for twelve years and have had good results with all of the paving on which we have used same.

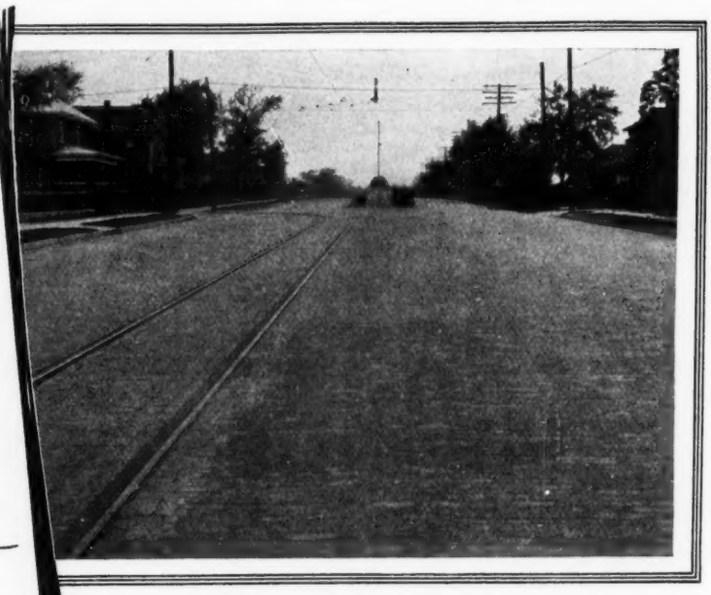
We have paved upper Main Street, South 8th Street and Exchange Street from fourth to fifth and these streets are in very good condition today.

Yours very truly,

CAMERON, JOYCE AND COMPANY

By Thos H Joyce
President.

THJ:V



Scene on Upper Main Street, Keokuk, Iowa, where Stanolind Paving Filler was applied many years ago. The filler has given excellent results on this street.

Good after Twelve Years Service

OUT in Keokuk, Iowa, Stanolind Paving Asphalt has been used for the past twelve years and in every instance it has given entire satisfaction. The picture above shows a section of Upper Main street (brick with Stanolind Asphalt Filler). This same product has given equally as satisfactory results at hundreds of other points throughout the country.

Stanolind Paving Asphalt, properly used, will give greater service and satisfaction, per dollar cost, than any other high class paving that can be used. This fact has been demonstrated repeatedly.

And at the time initial cost is considered, thought should also be given to the maintenance cost. In the case of Stanolind Paving Asphalt the latter is surprisingly low, as streets paved with it, in many cases, serve ten years without requiring any repairs whatever.

Ask for this free booklet

Check the record of any street constructed of Stanolind Paving Asphalt; the traffic it carries; the cost of construction and its upkeep, then compare these figures with like figures on any other type of paving. You'll see then why Stanolind Paving Asphalt has constantly grown in popularity with those who strive for the best roads. It is a plain case of dollars and sense.

If you are interested in formulating a constructive street or road building program for your town, city or county, we invite you to communicate with our staff of efficient, experienced road engineers. They will be pleased to co-operate with you and give you the benefit of their advice.

This service is rendered free of charge and it places you under no obligation whatever to us.

STANDARD OIL COMPANY
(INDIANA)

General Offices: 910 S. Michigan Ave., CHICAGO, ILLINOIS

ILLINOIS
Chicago
Decatur
Joliet
Peoria
Quincy

INDIANA
Evansville
Indianapolis
South Bend

KANSAS
Wichita

IOWA
Davenport
Des Moines
Mason City
Sioux City

S. DAKOTA
Huron

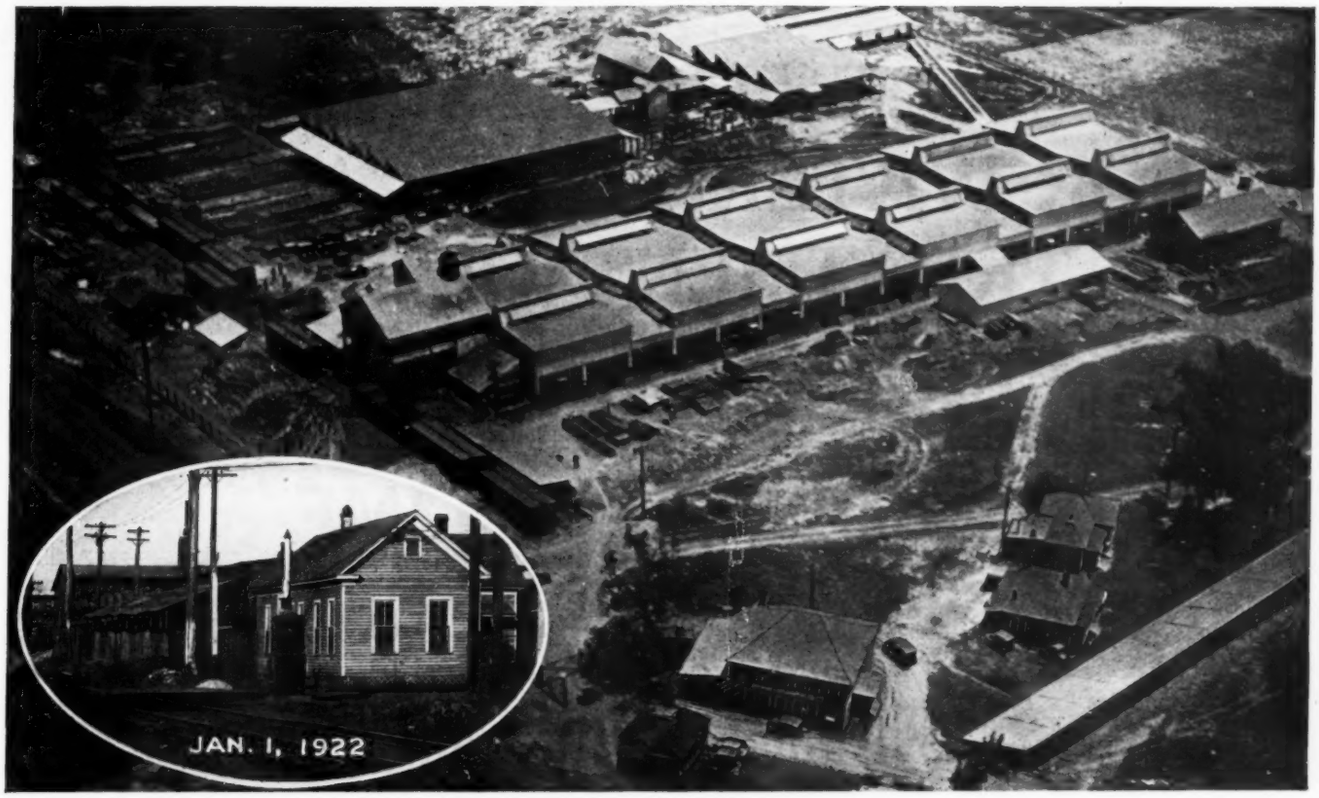
MICHIGAN
Detroit
Grand Rapids
Saginaw

N. DAKOTA
Fargo
Minot

WISCONSIN
La Crosse
Milwaukee

MINNESOTA
Duluth
Mankato
Minneapolis

MISSOURI
Kansas City
St. Joseph
St. Louis



Airplane view of plant of

McWANE CAST IRON PIPE COMPANY

In the pictures above is reflected the success of **McWane Precalked Joint Cast Iron Pipe.** In two and one-half years, the increasing demand for it has taken us from the small leased foundry shown in the insert above to one of the most modern pipe plants in America.

Only good pipe, equipped with a good joint, could do this.

Send today for your Booklet P, our prices and names of users near you.

One of the important elements of the growth illustrated above is the success of the very small cast iron pipe we make as a durable substitute for black and galvanized pipe. Made as small as 1¼, 2 and 3 inches. Uses standard fittings.

McWane Pipe Costs Less!

Unusual McWane Pipe Fact No. 4

We now make 4 and 6-inch FITTINGS WITH PRECALKED JOINTS. Another saving for you.

McWane Cast Iron Pipe Company

BIRMINGHAM, ALABAMA

manufacturers of

McWANE PRECALKED JOINT PIPE CAST IRON

District Sales Offices

819-21 Bankers Trust Bldg.
Philadelphia

422 Central Bldg.
Los Angeles

1301 Magnolia Bldg.
Dallas

Pipe sizes 1¼ to 6 inches. Standard lengths. Bell and Spigot type.

CHEMICALS
FOR WATER PURIFICATION
FOR TREATMENT OF SEWAGE

LIQUID CHLORINE

Tank Cars 1-ton Containers 150-lb. Cylinders

CHLORIDE OF LIME
SULPHATE OF ALUMINA

Highest Grades. Manufactured by

Pennsylvania Salt Manufacturing Co.

EXECUTIVE OFFICES: PHILADELPHIA

Works:

Natrona, Pa. Wyandotte, Mich. Menominee, Mich. Philadelphia

CAST IRON PIPE AND FITTINGS

American Cast Iron Pipe Company
Birmingham, Ala.

SALES OFFICES IN PRINCIPAL CITIES

GLAMORGAN PIPE & FOUNDRY CO.
LYNCHBURG, VA.

GENERAL FOUNDERS AND MACHINISTS

Manufacturers of

CAST IRON PIPE

For Water and Gas, Flange Pipe and Fittings

Western Office: 466 Peoples Gas Bldg., Chicago

JAMES B. CLOW & SONS

General Offices:

534-546 South Franklin Street, Chicago

Works:

Coshocton, O. Chicago, Ill. Newcomerstown, O.

Sales offices in all principal cities

Manufacturers of Cast Iron Pipe and Fittings

LYNCHBURG FOUNDRY COMPANY

Manufacturers of

CAST IRON PIPE AND FITTINGS

Main Offices: LYNCHBURG, VA.

Works at Radford, Va. and Lynchburg, Va.

DONALDSON IRON CO.
EMAUS, LEHIGH CO., PA.

MANUFACTURERS OF

CAST IRON PIPE

FOR WATER AND GAS

ALSO SPECIAL CASTINGS AND FLANGE WORK

National Cast Iron Pipe Co.
Birmingham, Ala.

Manufacturers of

Cast Iron Water and Gas Pipe

SALES OFFICES:

Peoples Gas Building, Chicago, Ill.
Kirby Building, Dallas, Texas
Land Bank Building, Kansas City, Mo.
Matson Building, San Francisco, Cal.

FRICTION FACTORS IN AN OLD 24-IN. CAST-IRON PIPE

Velocity	Loss Between Observation Points, Lb.*	Loss in Feet, per 1,000 Ft.	Coefficient — Hazen-Williams Formula	Coefficient — "n" in Kutter's Formula	Loss per 1000 Ft. New Pipe by Weston
4.86	20	3.00	131.4	0.0109	3.80
4.75	17	2.53	140.8	0.0103	3.64
4.24	16	2.38	130.0	0.0112	2.89
4.30	15	2.23	136.5	0.0106	2.97
Average.....			134.7	0.0107	

* No difference in elevation of gauges.

The line tested was a 24-in. main running from the pumping station at the shore of Lake Michigan to the town of Hammond about five miles inland. A few connections tap into this main near the pumping station and then for a distance of 16,000 ft. there are no

Sustaining Carrying Capacity

The tabulation in the clipping reproduced above shows that after twenty-five years of service, this main had a carrying capacity equal to that of new pipe.

Tables of carrying capacities in common use indicate a loss of capacity due to age. These tables are designed to include the cases where tuberculation takes place. This trouble is the exception, not the rule, and unless there is reason to believe tuberculation will occur, Cast Iron Pipe can safely be counted upon to deliver its full capacity for life. Where tuberculation does take place, Cast Iron Pipe can be readily cleaned without injury to the pipe.

THE CAST IRON PIPE PUBLICITY BUREAU, Peoples Gas Building, Chicago

CAST IRON PIPE

Our new booklet, "Planning a Waterworks System," which covers the problem of water for the small town, will be sent on request

THE BELL & SPIGOT JOINT

THE ACCEPTED STANDARD FOR UNDERGROUND CONSTRUCTION

Send for booklet, "Cast Iron Pipe for Industrial Service," showing interesting installations to meet special problems

BELL and Spigot Cast Iron Pipe is easily laid under exacting conditions. For instance, unusual difficulties were encountered while installing the 30-in. water supply for the New York and Pennsylvania Paper Company of Johnsonburg, Pa. In the above picture is shown a section of the line crossing a nearby creek.

This line was laid without a single workman standing in the water. Several lengths of pipe were suspended above the water level during caulking and as completed each section was allowed to sag into place on the bottom of the creek. The remarkable flexibility of Bell and Spigot Cast Iron Pipe made this simple method of installation possible.

Write us today and our Engineers will be glad to tell you how Cast Iron Pipe will simplify your problems.

United States Cast Iron Pipe and Foundry Co.

GENERAL OFFICE: BURLINGTON, NEW JERSEY

SALES OFFICES:

Philadelphia—1421 Chestnut St.
New York—71 Broadway
Pittsburgh—Henry W. Oliver Bldg.
Dallas, Texas—Magnolia Bldg.
Chicago—122 South Michigan Boulevard
Cleveland, Ohio—1150 E. 26th St. N. E.
Birmingham, Ala.—1002 American Trust Bldg.
San Francisco—Monadnock Bldg.
Minneapolis—Plymouth Bldg.
Buffalo—957 E. Ferry St.
Kansas City—Interstate Bldg.

CAST IRON PIPE
NATIONAL
IS MADE RIGHT

CAST IRON WATER AND GAS
PIPE

By Sand Cast and deLavaud Centrifugal Processes. Fittings
Flange Pipe, Flange Fittings and Special Castings

MANUFACTURED BY

National Cast Iron Pipe Company

General Office and Foundries
BIRMINGHAM, ALABAMA

SALES OFFICES:

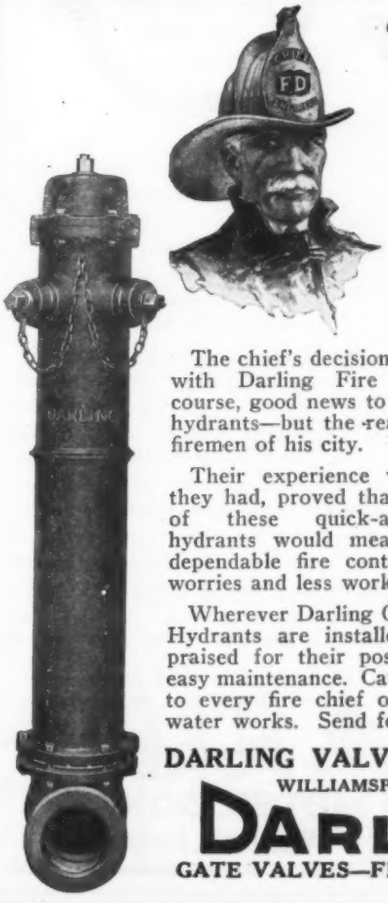
Chicago: 1231 Peoples Gas Building
Kansas City, Mo.: 603-04 Land Bank Building
Dallas: 916 Kirby Building
San Francisco: 1026 Matson Building

STOCKS CARRIED AT ALL SALES OFFICES

DIRECT OXIDATION
SEWAGE AND WATER TREATMENT
INQUIRIES INVITED
FROM
ENGINEERS

C. P. LANDRETH
OPERATING THROUGH HIS OWN
ORGANIZATION

DIRECT OXIDATION PROCESS CORP.
N. W. COR. 17th AND LEHIGH AV.
PHILADELPHIA
PENNA.



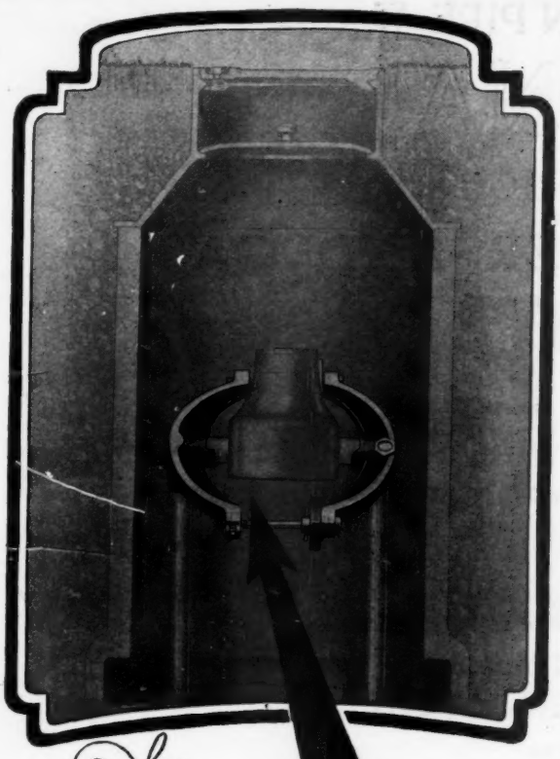
"Hereafter only Darling Hydrants will be purchased"

The chief's decision to equip throughout with Darling Fire Hydrants was, of course, good news to the makers of these hydrants—but the real rejoicers were the firemen of his city.

Their experience with what Darlings they had, proved that a full complement of these quick-acting, full-flowing hydrants would mean a more efficient, dependable fire control system with no worries and less work.

Wherever Darling Gate Valves and Fire Hydrants are installed they have been praised for their positive operation and easy maintenance. Catalog F is of interest to every fire chief or superintendent of water works. Send for it.

DARLING VALVE & MFG. CO.
WILLIAMSPORT, PA.
DARLING
GATE VALVES—FIRE HYDRANTS



The FORD METER GRIP

With ONLY ONE HAND You can take out meter or reset it

A few turns of the hand wheel tightens the grip on the spuds, making a perfect compression joint.

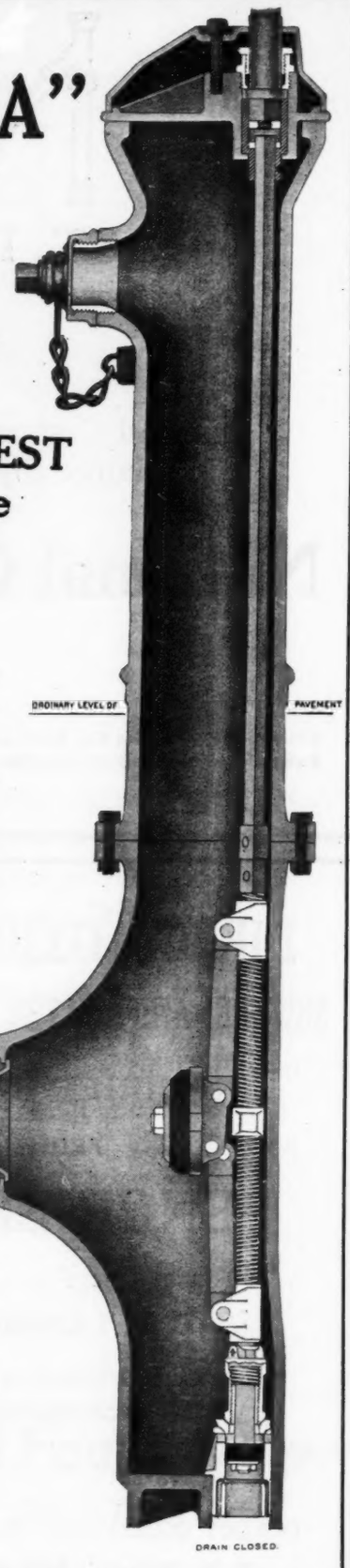
This is an unusually satisfactory meter setting, yet very inexpensive. It is especially adapted for use with meter boxes. By its use the distance between risers is reduced to the lowest possible limits, thus increasing the clearance between risers and sides of meter box and reducing the danger of freezing. Operating bolts not only make complete joints at the ends of meter spuds, but also unmake them. Meter can be removed or reset in line with only one hand—no meter couplings needed and no tools. Furnished with stop cock and test valve if desired

Write for illustrated catalog of meter settings and accessories.

The FORD METER BOX CO.
Wabash, Indiana

THE "IOWA"
Patented
Fire Hydrant

"The BEST therefore not the oldest."



If you are not using the "IOWA" fire hydrant, investigate the superior design and many advantages.

Covers every requirement in a perfect fire hydrant. Established 16 years throughout the United States and Canada.

THE IOWA VALVE COMPANY
OSKALOOSA IOWA

PUMPS

A Type for Every Service
Bulletins on request

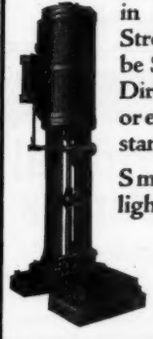
The Goulds Manufacturing Company
SENECA FALLS, N. Y.

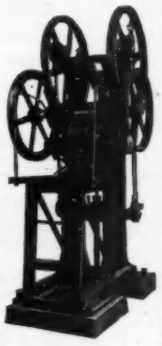
GOULDS

TRADE MARK
DOWNIE
REGISTERED U. S. PATENT OFFICE

DEEP WELL PUMPS

Downie Deep Well Pumps are offered for Heavy, Continuous Service in Deep Artesian Wells. They are built in Double and Single Stroke Models and may be Steam Driven, Belted, Direct Geared to Motor, or equipped for any other standard form of drive.



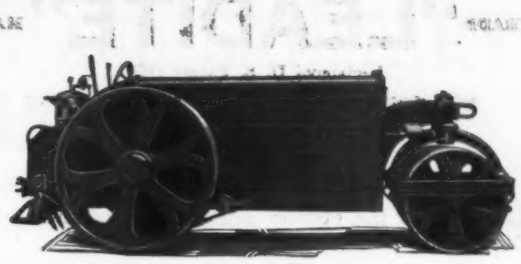


Smaller Pumps for lighter service.

Catalog No. 6 on request.

Downie Centrifugals, single and multi-stage, Catalog 801.

Keystone Driller Company
170 Broadway, New York. Monadnock Block, Chicago. Joplin, Mo.
Beaver Falls, Pa.



The Huber Motor Roller

THE Huber Four Cylinder Motor Road Roller combines a modern internal combustion engine with modern power transmission. It starts easy and keeps going. It has a low center of gravity, surplus power, convenient control, and economy of operation. The air controlled scarifier folds up neatly underneath the deck when not in use.

Because of its lack of vibration and ability to back and go forward quickly, without jerking or shifting of gears, a well known Chicago contractor has found the Huber motor roller very effective in rolling hot asphalt on Chicago streets. The results are greatly superior to those secured by tandem roller, as the compression is more uniform—there is no bridging over—consequently no soft spots left in the base.

This type of work that can not be done with a roller that vibrates or that reverses through gears, greatly extends the range of usefulness of the Huber Motor Roller. It should be included in the equipment of every paving contractor.

See the Huber at the Road Show! Greer Building Space G-15

THE HUBER MANUFACTURING CO.
108 Center Street Marion, Ohio, U. S. A.

HUBER ROAD TOOLS
MAINTAINERS - ROLLERS

TRADE **"LEADITE"** MARK

Registered U. S. Patent Office

FOR JOINTING CAST IRON WATER MAINS

NO CAULKING

Saves 50% to 75%

LEADITE is the pioneer self-caulking substitute for pig lead.

Be Sure It Is LEADITE and Accept No Imitations.

Leadite Joints Improve with Age

THE LEADITE COMPANY

1511 LAND TITLE BUILDING, PHILADELPHIA, PA.

CEMENT LINED SERVICE PIPE

Guaranteed Against Injury From Handling. Specially Designed Fittings That Make Perfect Joints.

CEMENT LINED PIPE COMPANY

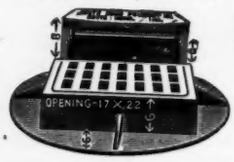
LYNN, MASS.

Formerly Lap-Joint Impervious Pipe Co.

South Bend Foundry Co.

SOUTH BEND, INDIANA

Adjustable Curb Inlet



WRITE FOR CATALOG AND PRICES

All Kinds of

Gray Iron Castings

Patent Chilled Manhole Covers

Made in 250, 300, 350 and 400, 470, 490 lbs. Weights

SLUICE GATES

SHEAR, FLAP, PLUG DRAIN AND BUTTERFLY VALVES

FLEXIBLE JOINTS

COLDWELL-WILCOX CO.

Box 574 Newburgh, N. Y.

STANDARD WOOD PIPE

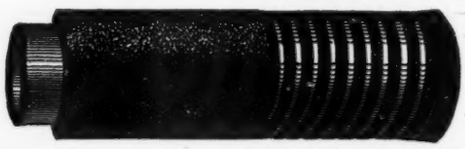
MORE DURABLE AND ECONOMICAL

Will furnish pipe to suit conditions.

Write for catalogue for full information.

STANDARD WOOD PIPE COMPANY

WILLIAMSPORT, PA.



Save 25 to 50 Per Cent by Installing

WYCKOFF WOOD PIPE, the modern water main, is not impaired by the effects of electrolysis, acid fumes or corrosion. It is light, strong and very durable. Lengths, 6 feet to 12 feet long. Size for size, it carries 14 per cent. more water than iron pipe. Costs less for transportation because it is lighter and easier to handle.

Established and continuously in business since 1855

May we send Catalog giving fullest details?

A. WYCKOFF & SON COMPANY, Elmira, N. Y.

The Originators of Machine Made Wood Pipe

ALDRICH PUMPS

There's an Aldrich Pump For Every Service!

Write for Catalogue.

Department 6

THE ALDRICH PUMP COMPANY

ALLENTOWN, PA.

Sales Agencies in Principal Cities.

Send for data No. 50—Engineering Tables—It's Free.

DeLaval Centrifugal Water Works Pumps

Handle Water at Lowest Cost

If interested in Geared Steam Turbine Driven Pumps, Electric Motor Driven Pumps, or Internal Combustion Engine Driven Pumps, ask for our catalog W-53.

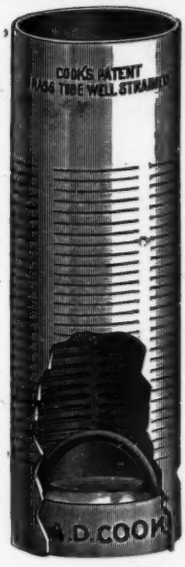
DeLaval

Steam Turbine Co., Trenton, N.J.

HYDRAULIC AND SANITARY EQUIPMENT

SCREENS FOR SEWAGE AND TRADE WASTE
CENTRIFUGAL PUMPS
GATES—VALVES—CONTROL APPARATUS

THE SANITATION CORPORATION
165 BROADWAY NEW YORK CITY



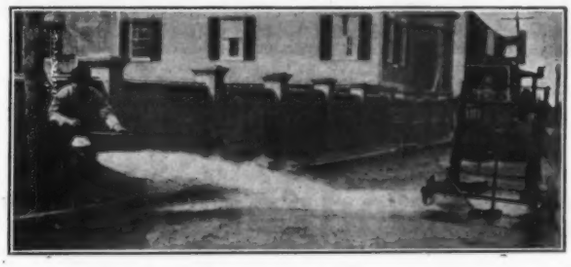
If You Have a DEEP WELL ending in WATER-BEARING SAND OR GRAVEL.

equip it with the COOK PATENT BRASS TUBE WELL STRAINER and secure the maximum capacity of the well free from sand or particles of any kind. These strainers are in use by the Department of Water Supply of New York City, Parkersburg, W. Va., Memphis, Tenn., and Dayton, Ohio.

Upon the completion of the well, allow me to quote upon a Steam Belt or Motor Driven Deep Well Pumping Outlet.

Write for New Catalogue

A. D. COOK, Manufacturer Lawrenceburg, Ind., U. S.



Clean Water Mains Deliver Full Capacity

If there is growth or deposit in your mains it will seriously affect the carrying capacity. It will cost a great deal less to send water through clean mains.

During the past 15 years we have cleaned mains in several hundred cities and the results in increased pressure and reduced operating costs have been thoroughly satisfactory.

We are glad to confer with municipal officials or water companies.

National Methods Are Patented

National Water Main Cleaning Co.
54 Church Street New York

"STEWART SEWER CLEANING MACHINE"
"Used in Nearly Every State in the Union"

SEWER RODS

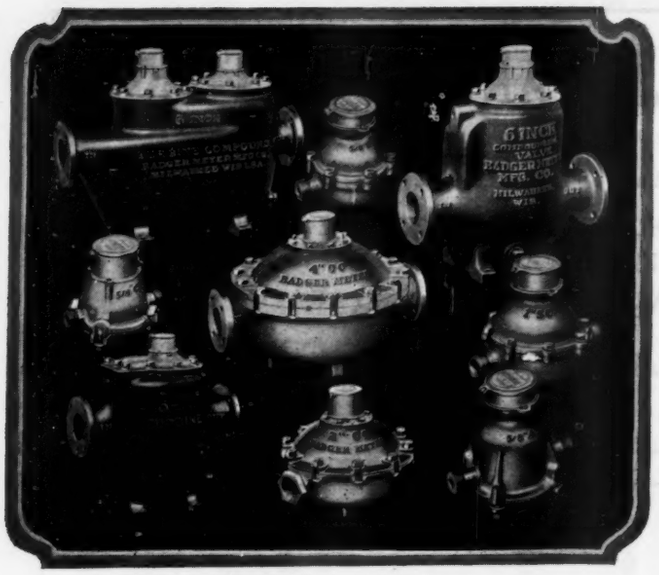
We pay freight and ship for trial. Who else will do it?
W. H. STEWART

1614 Locust Street, St. Louis, Mo.
133 George Street, Boston, Mass.

Manufacturers of

REINFORCED CONCRETE PIPE
FOR
SEWERS AND CULVERTS

CORE JOINT CONCRETE PIPE CO., Inc.
IRVINGTON, N. J.



There is a particular Badger Water Meter for every service. They come in sizes ranging from ⅝ in. to 6 in. Specify Badger Meters, they are designed to meet the most exacting water works requirements.

Make Badger Meter your Standard for Comparison!

Just as you judge other equipment by standards—compare water meters with the Badger. Make it your *standard for comparison.* Point for point, base your rigid inspection on the outstanding construction advantages of the *Badger.* Be assured that the meter is *fit.* That it will *tick-off accurately.* That it will *register* an impartial registration year after year. Don't accept less.

With a complete range of meters, you can point to a Badger for every service. From the small ⅝" disc to the large 6" turbine compound you will find the same thoroughness in design and manufacture.

Badger Meters have long been highly reputed. Chiefly because they are built right. They are designed by practical water works engineers. All parts are readily accessible and made of such metals and materials that will not corrode, nor **wear unduly. They are** made for long life and service.

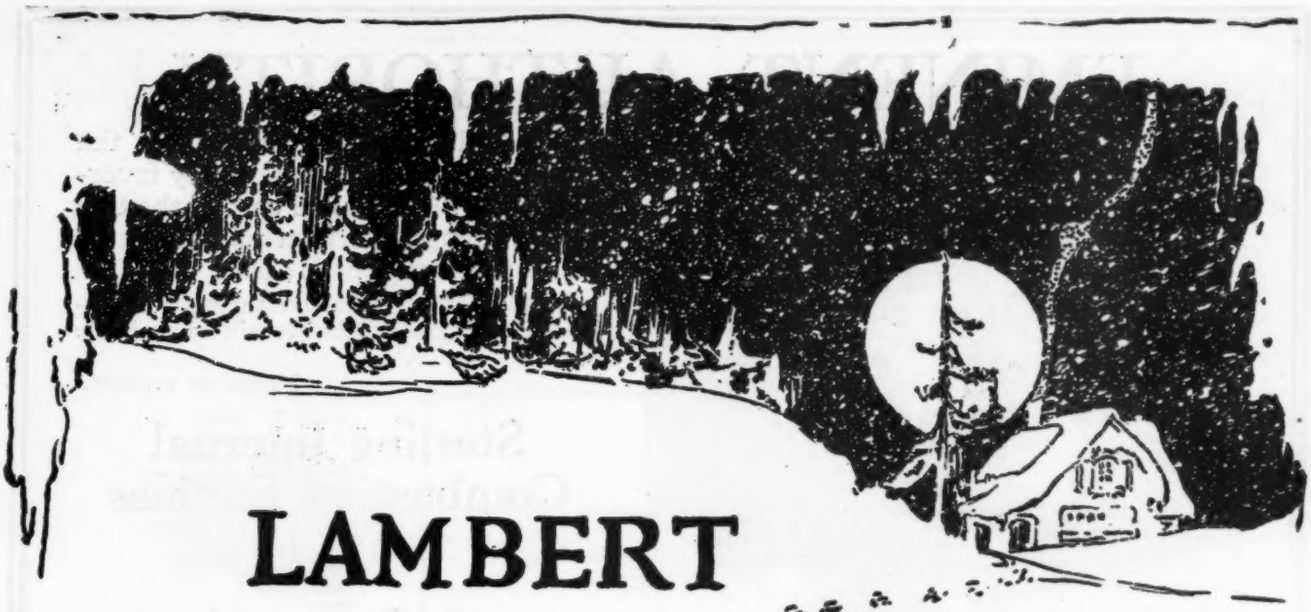
Let Badgers prove their dependability, accuracy and earning powers. Remember they are *faithful to the last drop.*

Write for special bulletins.

BADGER METER MANUFACTURING CO.
841 30th Street Milwaukee, Wis.

BRANCHES
111 W. Washington Street, Chicago, Ill.
414 Interstate Bldg., Kansas City, Mo.
32 Court Street, Brooklyn, N. Y.
1621-39 Fifteenth Street, Denver, Colo.

BADGER METERS
"Faithful to the last drop"



LAMBERT
FROST PROOF
METERS

Can be Frozen
without damage

Note the Illustration

See how the top and bottom castings part — when under excessive pressure caused by frost. After freezing, the slitted collars can be reclosed and the meter bolted anew.

This operation can be repeated without the necessity of furnishing any new parts.

Couple of minutes' labor to put it back in shape. Guaranteed for one year but will last a lifetime. Made in sizes 5/8", 3/4" and 1" ready for delivery.

For the asking—
Catalogue showing full line of meters for every requirement

Thomson Meter Company

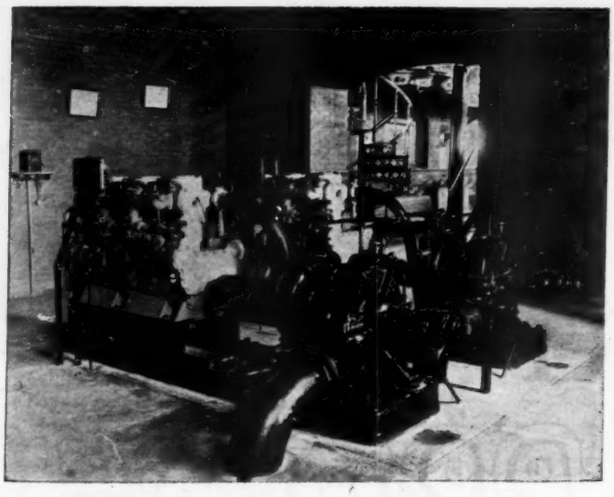
100-110 Bridge Street **Brooklyn, N. Y.**

EMINENT AUTHORITY

Says: "With the gasoline engine driven pumps installed, it is expected that the coal bills each year will be reduced by $6,000. This is seen to compare very favorably with the installed cost of the two gasoline engine driven pumps which was approximately $13,000.

In addition to the above saving, the fireman in charge of the boiler will be available for other duties."

Name on request.



Brockville, Ont. Babcock, Wilcox & Goldie & McCulloch Pumps, each 2,450,000 Imperial gallons per day at 90 lbs. pressure, or 2,000,000 at 110 lbs. (fire pressure), using Sterling six cylinder 5¼" bore engines at 1400 revolutions, over 200 H.P. developed.

Sterling Internal Combustion Engines

Sterling — THE ENGINE OF REFINEMENT

STERLING ENGINE COMPANY, Dept. C, Buffalo, N. Y., U. S. A.

Single units to 250 B.H.P. load, 1200 revolutions, $20 a horsepower.

NIAGARA AND AMERICAN WATER METERS

SOLID CASING TYPE

⅝-inch Size

ONE MODEL OF WORKS

FROST BOTTOM TYPE

⅝-inch Size

Meters having outside casing of galv. cast iron are Niagaras. Those having outside casing of bronze are Americans. The works within the casings are always alike and made of bronze, hard rubber and nickel silver. All submerged working bearings are protected against sand and sediment. The intermediate gears revolve on frictionless pivot bearings that prevent vertical wear and keep the gears in proper mesh. The hard rubber measuring disc is reinforced with a perforated sheet metal plate. The purchaser has option of round reading or straight reading register, indicating in cubic feet, U. S. gallons, imperial gallons or litres.

Meters of the frost bottom type are made in sizes up to 1 inch only and in both galv. iron casing, and bronze casing. The works are exactly like those in the solid case meters and are equally accessible for inspection or cleaning. When these meters "freeze up" and the ice pressure reaches 450 lbs. the frost bottom bursts and permits all parts of the disc chamber and of the intermediate gearing to separate and thereby be relieved from injurious strain. It is the only frost protected meter in which the intermediate gearing separates into parts. It is the only meter provided with a new disc chamber seat after each freezing. A new ⅝" frost bottom costs 35 cents net.

Fully illustrated catalog and prices mailed upon request.

BUFFALO METER CO.

Est. 1892

2920 MAIN STREET **BUFFALO, N. Y.**

WATER METERS

Arctic Frost-Bottom

Tropic All-Bronze

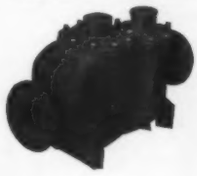
Keystone All-Bronze

Eureka Current

Meters for Water, Gas, Air, Oil, Gasoline, Oxygen, Hydrogen, Acetylene, and Other Fluids

WATER AND GAS METER PROVERS

Keystone Compound



PLEASE NOTE CHANGE OF ADDRESS

PITTSBURGH METER COMPANY

General Office and Works: 7800 Susquehanna St., Pittsburgh, Pa.

SALES OFFICES:

New York, 50 Church Street
Chicago, 5 So. Wabash Avenue
Kansas City, Mutual Building
Columbia, S. C., 1433 Main Street
Seattle, 4038 Arcade Building
Los Angeles, Union Bank Building

HIGH GRADE WATER WORKS SUPPLIES

PIPE CUTTING MACHINE

Cuts as easily and smoothly as if done in a lathe

No. 1 Size for cutting 4-in, 6-in. and 8-in. pipe.
No. 2 Size for cutting 10-in., 12-in., 14-in. and 16-in. pipe.
No. 3 Size for cutting 18-in., 20-in. and 24-in. pipe.
No. 4 Size for cutting 30-in., and 36-in. pipe.
No. 5 Size for cutting 42-in, and 48-in. pipe.

The Smith Valve Inserting Machine

The Latest and Most Important Tool Devised to Aid Water or Gas Departments.

This machine will cut section of pipe, place required size valve in position, complete the work in every detail and all done without any interruptions to supply.

Write us and we will make you a proposition, either on purchase of machine or on a rental basis.

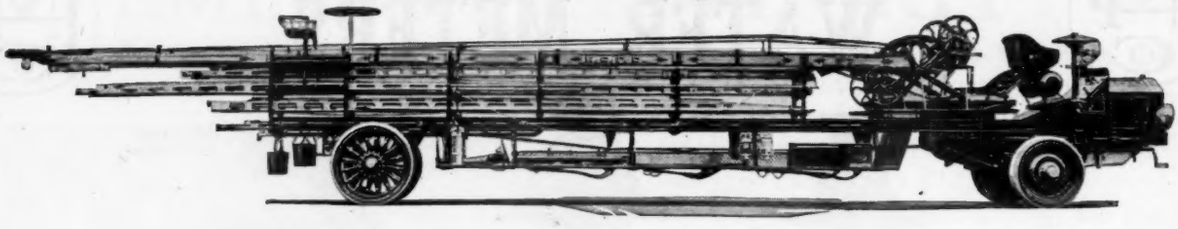
We guarantee to insert all sizes from 4-in. to 24-in., inclusive, without shutting off supply.

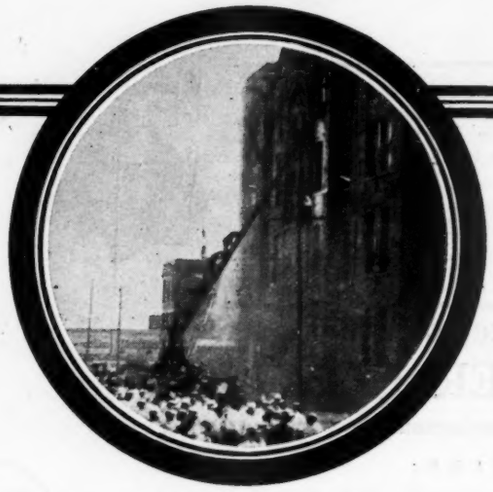
Makers of Smith Tapping Machine, Valves, Lead Furnaces, Pipe Cutting Machines, Gate Valves and Other Water Works Specialties.

WRITE FOR CATALOGUE

The A. P. Smith Co.

East Orange, N. J.





The Performance of

American-LaFrance Type 31 Aerial Truck

is Conspicuous at Every Fire where it is present.

Many fire departments have expressed their amazement at the ease with which the American LaFrance Type 31 Aerial Truck can be handled at high speeds. It is due to the unusually low center of gravity for a truck of its size. This point assures safety and ease of handling.

The ladders are made from especially selected stock, thoroughly seasoned to preserve the strength of the wood.

Let us send you data on the Type 31.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

BRANCHES
NEW YORK
BOSTON
ATLANTA
PITTSBURGH
CHICAGO
DALLAS

ELMIRA, N. Y.
CANADIAN FACTORY
TORONTO, ONT.

BRANCHES
DENVER
MINNEAPOLIS
LOS ANGELES
SAN FRANCISCO
WASHINGTON
PORTLAND

Among the standard friction tests which show the marked superiority of Firestone Friction Tape is the separation test. Preparatory to this test the tape is wound on a 1 inch mandrel under a tension of 10 lbs., as shown in the illustration above.

Above the tape is shown being separated under a 4 lb. tension. Specifications of the American Society for Testing Materials allow 30 inches separation per minute. The average for Firestone Friction Tape is but 15 inches. In the standard heat test of 100 degrees C for 24 hours, Firestone Friction Tape registers an average equally as high above A. S. T. M. requirements.

More Efficient on the Job

Because More Thoroughly Tested In the Making

FIRESTONE Friction Tape is preferred for all classes of electrical work because the rigid tests to which it is subjected at the factory assure a more tenacious grip, more perfect insulation, and longer service on the job.

In tensile strength, in dielectric properties, in freedom from sulphur and in uniformity of both fabric and friction, Firestone Tape measures up to standards far higher than those of the American Society for Testing Materials and other accepted authorities.

Regular users of friction tape, the leading utility companies and electrical manufacturers as well as the man who buys for handy use around the house, appreciate this extra value.

This customer satisfaction is giving dealers everywhere steadily increasing sales on Firestone Friction Tape. Available in bulk, under jobbers' name or in standard Firestone cartons. Discounts and complete specifications promptly supplied from the Home Office at Akron, or from any Firestone Branch.

The Mark of Quality

Firestone

FRICTION TAPE

INDEX TO ADVERTISEMENTS

A

Acme Road Machinery Co..... 67
Aldrich Pump Co..... 90
Alexandria Hotel..... 66
Alvord, Burdick & Howson..... 68
American Appraisal Co..... 68
American Cast Iron Pipe Co..... 84
American Cement Machine Co.... 69
Amer.-La France Fire Engine Co. 96
American Vibrolithic Corporation. 55
American Well Works..... —
Asphalt Association..... 52
Atlas Lumnite Cement Co..... 9
Austin Western Road Mach. Co... 2

B

Badger Meter Mfg. Co..... 92
Baker Mfg. Co..... 29
Ball Engine Co..... 56
Barbour Stockwell Co..... 71
Barrett Co., The..... 8
Bay City Dredge Works..... 74
Beaxer Mfg. Co..... 16
Bellevaire Hotel..... 73
Black & Veatch..... 68
Brossman, Chas..... 68
Buffalo Meter Co..... 94
Buffalo Springfield Roller Co..... 64
Builders' Iron Foundry..... 72
Burch Plow Works Co..... 71
Burns & McDonnell Eng. Co..... 68
Butler Mfg. Co., The..... —
Byers Machine Co..... 53

C

Caird, James M..... 68
Carey, Philip Co..... 3
Cast Iron Pipe Publicity Bureau.. 85
Cement Lined Pipe Co..... 90
Chain Belt Co..... —
Champion Corp..... —
Chase & Lyman..... 63
Chausse Oil Burner Co..... 28
Clow, James B., & Son..... 28
Coldwell-Wilcox Co..... 90
Columbia Wagon & Body Co.... 71
Connery & Co., Inc..... 32
Convertible Wagon Trailers, Inc.. 71
Cook, A. D..... 91
Core Joint Concrete Pipe Co..... 91
Cressy Road Sprayer Mfg. Co.... 11
Crown Rock Asphalt Co..... 54

D

Darling Valve & Mfg. Co..... 87
Davis, B. H..... 68
Decarie Incinerator Co..... 70
Dee, Wm. E., Co..... 70
De Laval Steam Turbine Co..... 90
Direct Oxidation Process Corp.... 87
Dixon, Jos., Crucible Corp..... 72
Domestic Engine & Pump Co..... 63
Donaldson Iron Co..... 84
Dorr Co..... 5
Dow Chemical Co.....51-52
Dow & Smith..... 68
Du Pont de Nemours Co., E. I.... 65

E

Eastern Clay Products Ass'n..... 31
Edson Mfg. Co..... 59
Electro Bleaching Gas Co..... 73
Erie Steam Shovel Co..... 61
Essco Mfg. Co..... 45

F

Farasey, J. D., Mfg. Co..... 71
Federal Meter Co..... 73
Firestone Tire & Rubber Co..... 97
Ford Meter Box Co..... 88
Ford Motor Co..... 15

G

Galion Iron Works & Mfg. Co.... 30
Gamon Meter Co..... 72
General Filtration Co..... 72
General Motors Truck Co..... 13
Glamorgan Pipe & Foundry Co... 84
Goulds Mfg. Co..... 89
Granite Paving Block Mfrs. Asso. 100

H

Hadfield-Penfield Steel Co..... 79
Handy Sack Baler Co..... 74
Hansen, A. E..... 68
Hazen & Whipple..... 68
Headley Good Roads Co..... 67
Heltzel Steel Form & Iron Co.... 27
Hill, Nicholas S., Jr..... 68
Hollenden Hotel..... 69
Holt Mfg. Co..... 12
Hoosier Asphalt Co..... 7
Huber Mfg. Co..... 89

I

Independent Concrete Pipe Co.... 99
Indian Refining Co..... 69
Ingersoll-Rand Co..... 34
Ingersoll-Rand Co..... 34
Insley Mfg. Co..... 26
International Harvester Co..... —
International Motor Co..... 14
Iowa Valve Co..... 88

J

Edw. J. Jackoboice..... 17
J. T. Tractor Co..... 60
Jaeger Machine Co..... 77
Johnson, Geo. A..... 68
Josephie Co..... 71

K

Kentucky Rock Asphalt Co.....20-21
Keystone Driller Co.....89-69
Kinney Mfg. Co.....24-25
Koehring Co..... 81

L

Landreth, C. P..... 89
Layne & Bowler Co..... 72
Leadite Co..... 90
Link-Belt Co..... 57
Littleford Bros..... 65
Lufkin Rule Co..... 74
Lynchburg Foundry Co..... 84
Locomotive Crane Co..... 58
Locomotive Foundry Co..... 84

M

Mandt Co..... —
Marseilles Hotel..... 73
Martinque Hotel..... 74
McNeil & Bro. Co..... —
McWane Cast Iron Pipe Co..... 83
Mohawk Asphalt Heater Co..... 64
Monarch Tractors, Inc..... 66
Mueller Mfg. Co..... 43
Municipal Street Sign Co..... 73

N

Nat'l Cast Iron Pipe Co.....84-87
Nat'l Paving Brick Mfg. Ass'n.... 4
Nat'l Water Main Cleaning Co.... 91
Norwood Engineering Co..... 72
Newport Culvert Co..... 62

O

Orton & Steinbrenner Co..... 58
Ohio Valley Rock Asphalt Co.... 19

P

Pacific Flush Tank Co.....56-71
Pawling & Harnischfeger Co..... —
Pearse, Greely & Hansen..... 68
Penn. Salt Mfg. Co..... 84
Pershing Hotel..... 66
Pittsburg Meter Co..... 95
Pollock, Clarence D..... 68
Portland Cement Association..... 10
Potter, Alexander..... 68

R

Rawls Machine & Mfg. Co..... 49
Robinson Clay Product Co..... 70
Russell Grader Mfg. Co..... 60

S

Sanitation Corporation..... 91
Schramm, Inc..... 61
Shelby Hotel..... 72
Skelton Shovel Co..... 52
Smith, A. P., Mfg. Co., The..... 95
Snell, Geo. H..... 73
South Bend Foundry Co..... 90
Standard Oil of Indiana..... 82
Standard Oil (N. Y.)..... 6
Standard Wood Pipe Co..... 90
Sterling Eng. Co..... 94
Stewart, W. H..... 91
Sullivan Machinery Co..... 47
Sweet's Steel Co..... 51

T

Texas Co.....Cover
Thomson Meter Co..... 93

U

U. S. Cast Iron Pipe & Fdy. Co.... 86
Universal Road Mach Co..... 59
Universal Crusher Co..... 18
Union Iron Works..... 51

W

Warren Bros. Co..... 22
Wehr Co..... 23
Westinghouse Elec. & Mfg. Co.... 33
Wood, R. D., & Co..... 92
Wood Hydraulic Hoist & Body Co. 62
Wyckoff A., & Son Co..... 90

There is no question about its Dependability!

Independent Concrete Pipe Co.
201 N. West Street, Indianapolis, Ind.

Use Independent Reinforced Concrete Pipe

in all your sewer improvements

The past years should be sufficient proof of the growing popularity of properly manufactured Reinforced Concrete Pipe. It has existed in the minds of some that reinforced concrete pipe is not adaptable to all characters of sewer improvements. This lack of belief in its merits has been entirely swept away by the uncompromising performance of properly built reinforced concrete pipe. Later years have offered sufficient proof to even the most skeptical that reinforced concrete pipe with its strength, durability and adaptability is rapidly becoming the foremost material used in sewer construction.

Independent Reinforced Concrete Pipe is built right.

Both Consulting and City Engineers throughout the country have recognized the advantages of properly made Reinforced Concrete Pipe.

The Independent Concrete Pipe Company solicits your inquiries and are always pleased to have their Engineering Department assist in solving your difficulties.

Wire, write or phone for estimate.

"STONE IS BEST BY EVERY TEST"

Specify

GRANITE FOR PAVING

AND CURBING

The

Granite Paving Block Manufacturers' Association of the United States, Inc.

31 State Street **Boston, Mass.**

Representing

The World's Greatest Granite Quarries